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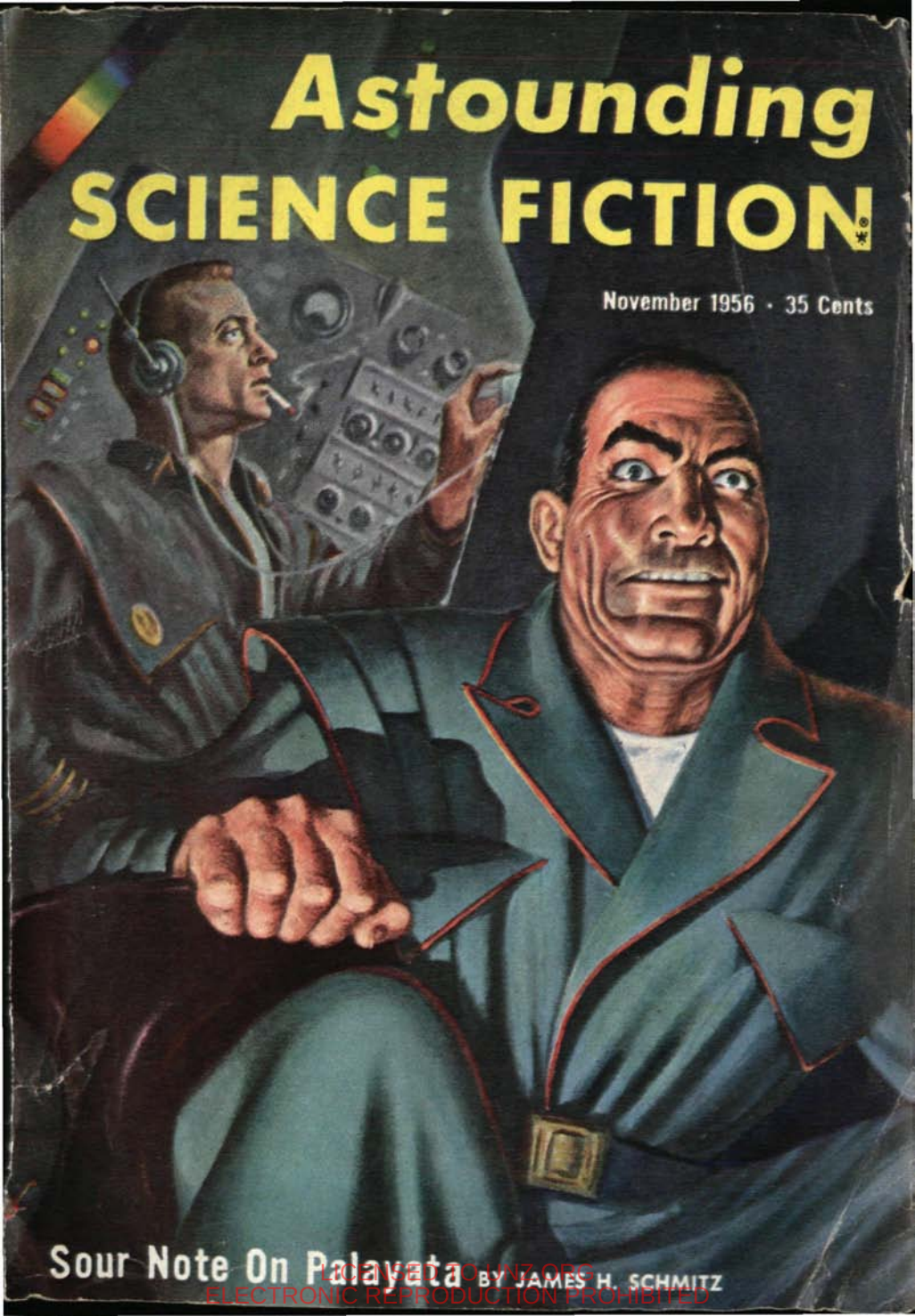

Sour Note On Palavata BY JAMES H. SCHMITZ

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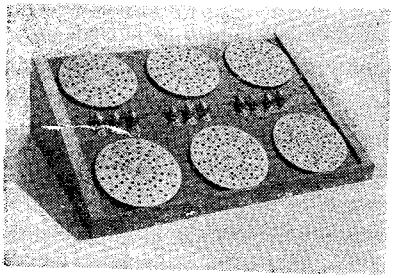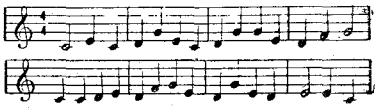

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EDITORIAL

THE INVISIBLE RIVER

Let's suppose that, back about 1920, a man stood up at a meeting of the National Geographic Society, and said that the maps of the Continental United States were seriously inadequate. "Why," he says, "there's a river flowing through the United States that's more than ten times as big as the Mississippi, that isn't shown on your maps at all. It moves more than ten times as great a mass of matter, and has an enormous effect on the whole welfare and economy of the nation . . . yet it isn't even indicated on your maps! Not only that, but there are a number of canyons bigger than the Grand Canyon of the Colorado that aren't on the maps."

"Impossible!" snaps an irate geographer. "Within the boundaries of the Continental United States? Fantastic nonsense! Why, we might be missing a lake a mile or so across, or a few brooks and streams, but with the amount of aerial observing that's been done in this country, to miss a river bigger than the Mississippi, or canyons greater than the Grand Canyon is absolute nonsense! Where is this fantastic river of yours? Show it to us!"

"I can't," says the critic. "It's invisible."

After the laughter and anger subsided, the meeting would resume its course, minus the crackpot with the weird ideas.

And the mighty river more than ten times greater than the Mississippi would roar on its way, not ten miles away from the learned members, completely invisible as it moved a mass of matter far greater than any visible river, each day and week changing the whole climate, and affecting the entire economy of the nation. The mighty, invisible river in the sky—the Jet Stream, roaring around the Earth at up to three hundred miles an hour, a stupendous flow over one hundred miles wide and two miles deep.

Of course the immense canyons that dwarf the Grand Canyon of the Colorado are equally invisible—

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though one of the greatest starts less than a dozen miles from the great port of New York. It begins well within the boundaries of the Continental United States, though it does, of course, extend far out beyond the legal twelve-mile limit.

Unfair? Well . . . it wasn't the *kind* of river the geographers had in mind, but the canyons certainly were exactly the same kind, save only that they happened to be drowned canyons. And the immense climatic importance of the Jet Stream certainly made it belong on any complete mapping of the planet! Geographers were just as much confused by the "river in the ocean" when the Gulf Stream was first recognized—but their climatic maps certainly wouldn't make sense without realization of that stupendous river.

The difficulty is that when any area has been fairly thoroughly explored, and its boundaries plotted, its general internal structure determined, the students of that field become thoroughly convinced that, henceforth, there will be no new, startling, broad features to be discovered. The outlines need still to be filled in, the details developed, and precision achieved—but the general structure of what can be and what cannot be is known.

By 1920, there could be no El Dorado, the City of Gold, lost somewhere in the western reaches of America; exact aerial mapping had not yet been completed, of course, but the aerial observation had been more than sufficient to determine that no such major feature could have escaped detection.

Gulliver could sail to strange islands, and find marvelous cultures without limit; by 1920 he couldn't. The civil engineering works of Brobdignagia would have been detected long before.

In 1890, physics and chemistry knew the limits of their field; atoms existed, and were immutable.

By 1900, the boundary had taken on a somewhat different appearance; they'd found that there was another level of organization in the Universe. Atoms did transmute themselves; atoms had internal structure. Physics was, as a matter of fact, in a grand mess; the electron had been recognized, X rays discovered—and the designation X was depressingly appropriate; they were the Unknown to end all unknowns!—and radio was being developed. The inverse square law seemed to be going out the window; radio waves didn't seem to be particularly interested in the inverse square law, but, instead, seemed to follow some incomprehensible and whimsical "law" all their own. On the inverse square law, Marconi simply *couldn't* transmit a signal across the Atlantic; it could be shown mathematically that it was impossible for a dozen reasons. (They figured out the business of reflections between the ionosphere and ground later, and got the inverse square law working again.)

Trained in the period 1920-1950, as most of us have been, the shat-

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tering effects of the discoveries of the 1890's and the first years of the Twentieth Century are not apparent to us; things had been reasonably reorganized by the time we came along. But the organization of physics, between 1890 and 1910, had crumbled apart to about the extent San Francisco did. That didn't show, either, a decade later—but it made a mighty impression on a lot of people who lived there at the time.

The effects of that period of immense uncertainty have hung over in a very different area, however. To date, there are only two types of interaction recognized in science; the direct-contact, zero-distance interaction of mechanical engineering, and chemistry, and the indirect-contact interaction of radiation. Sound, light, and the like, the vibratory-contact type of interaction, was known to exist in 1900—but, in 1900, the mysterious X rays and radium emanations presented a strange problem. They definitely were *not* light; they went right through solid matter. (Which wasn't yet thought of as the emptiness we know it to be; men of that time hadn't been oriented from childhood on the emptiness-of-matter concept that we have been.) And X rays *were* the unknown rays. No physicist was in any position to come out with any authoritative statements as to what Could Be and what Could Not Be; they'd just had their whole cosmology yanked out from under them by the disintegration of the atom, making Grade A liars out of them for their authoritative statements that the atom was immutable, and X rays had made them liars in saying that nothing could see through solid matter. And, at the time, it looked as though radio waves were going from England to Newfoundland via a penetration of a good hunk of the Earth's crustal rocks that lay directly in between.

The mystics, about that time, came triumphantly to the fore with explanations of their peculiar phenomona. "Vibrations!" they cried, "Radiations! We have said all along that these could penetrate solid matter, and now—*now* you know—physics has found that radiations can act through solid matter!"

Unfortunately, they're still stuck with that idea. They haven't yet discovered that physics knows what radiation is now, that the "X" of "X rays" has been replaced by "Roentgen," because they're no longer unknown. The area of radiation has been mapped; sure, there are details to be filled in, but no vast, broad new discoveries *can* exist in the field. We know too much of the outlines, the general shape of the territory. Anyone trying to say that the strange phenomena are "radiations" is promptly and properly marked down as a crackpot; they aren't, and can't be. Radiations *do not* behave that way. Period. Full stop.

Rhine's work indicates psi phenomona are not distance-sensitive.

Then they are not a contact-phenomena type; they don't belong in mechanical engineering or chemi-

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cal engineering, or electrical-circuit theory.

They don't fit into the radiation category; their behavior, if acknowledged as real phenomena, do not fit the category of the indirect-interaction system of radiation.

And the territory's too well mapped for the physicists to have missed any enormously important phenomena such as those implied by psi phenomena. They might miss a few details—a lake a mile across perhaps, but certainly it's crackpot nonsense to say they could have missed a river ten times bigger than the Mississippi, or canyons vaster than the Grand Canyon of the Colorado.

And the idea of an invisible river bigger than the Mississippi hidden right here in the United States is obvious crackpotism.

The problem is a communication problem. The scientist can't discuss anything that can't be related to physics; the psionics man keeps making the same, bull-headed mistake, year after year, of trying to crowd the great river into the already outlined map. He keeps saying that El Dorado lies between Denver and Salt Lake City.

If you want to know why, try getting hold of British Patent #735,290, issued to Thomas Bernard Orton, on August 17, 1955, titled "Improvements In Electrical Apparatus for the Therapeutic Treatment of Disease." It's a device that obviously belongs in the non-contact interaction category that we've been calling "psionic machines." It's got some of the wildest, weirdest unscientific "science" in it I've ever encountered. The explanation of how the device works is a lulu! I don't know who dreamed it up, but he could, if he'd cut down the heavy-duty hyper-technical almost-scientific statements to a degree we could handle, write some wonderful science-fiction explanations of hyperspatial travel.

The United States Patent Office won't grant patents on obviously nonsense items; "obvious nonsense" is somewhat loosely, and rather personally, defined. But apparently the Patent Office over here is staffed rather largely by gentlemen from the State of Missouri. It could not, of course, be expected that the British Patent Office would be staffed from the same source; the results, with respect to what is acceptable, are somewhat different.

When Hieronymus tried to patent that device of his that we discussed a few months back, he tells me he had to make a number of trips to Washington and demonstrate a working model that did what he said it would do. The Patent Office staff was definitely of the Missouri type.

Since you can't patent a law of nature, the patent office can't demand that you establish a law of nature to get a patent; Hieronymus merely had to demonstrate a *fact* of nature, which is somewhat different. His

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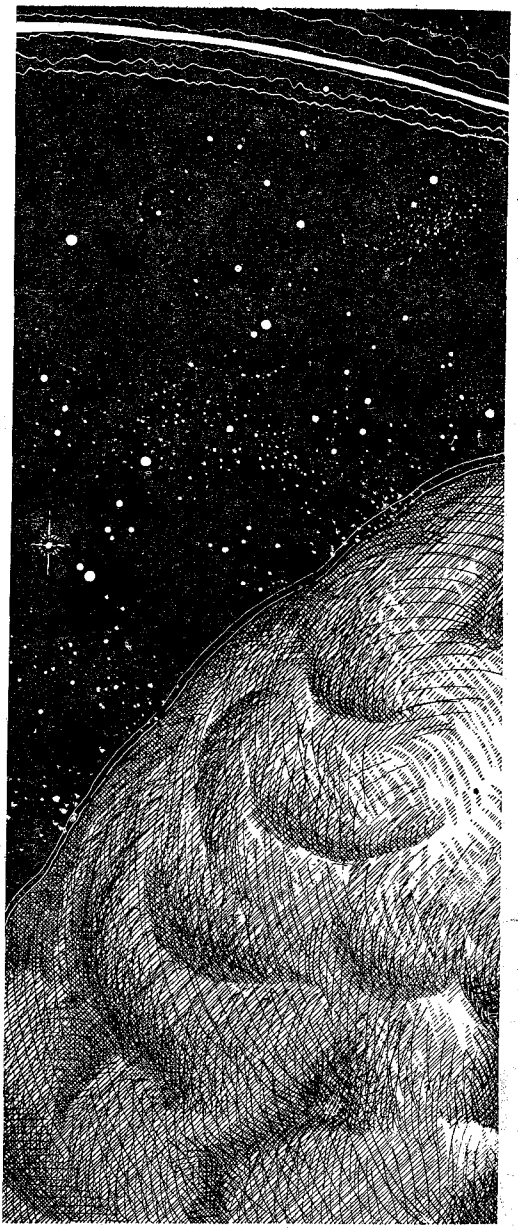
SOUR NOTE ON PALAYATA

For every advance in exploring the macrocosmic, Man has made an advance in exploring the microcosm. The farther out we go—the farther inward we may have to explore, too!

BY JAMES H. SCHMITZ

Illustrated by Freas



Bayne Duffold, Assistant Secretary of the Hub Systems' Outposts Department, said that the entire proposed operation was not only illegal but probably unethical. Conceivably, it might lead to anything from the scientific murder of a single harmless Palayatan native to open warfare with an opponent of completely unknown potential.

Pilch, acting as spokesman for the Hub's Psychological Service Ship stationed off Palayata, heard him out patiently. "All that is very

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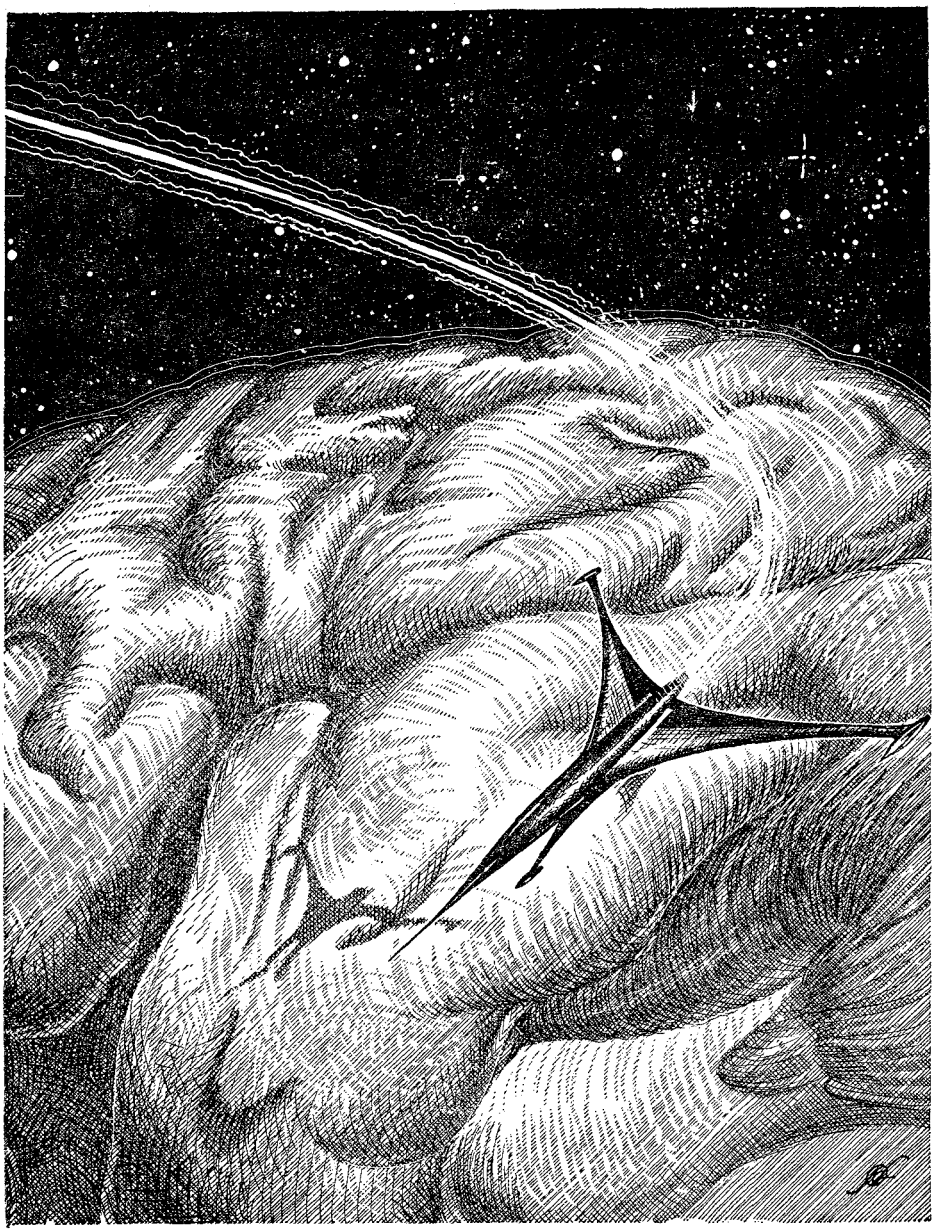

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true, Excellency," she said then. "That is why you were instructed to call in the Service."

Assistant Secretary Duffold bit his thumbtip and frowned. It was true that the home office had instructed him, rather reluctantly, to call in the Service; but he had made no mention of that part of it to Pilch. And the girl already had jolted him with the information that a Psychological Service operator had been investigating the Palayatan problem on the planet itself during the past four months. "We figured Outposts was due to ask for a little assistance here about this time," was the way she had put it.

"I can't give my consent to your plan," Duffold said with finality, "until I've had the opportunity to investigate every phase of it in person."

The statement sounded foolish as soon as it was out. The remarkably outspoken young woman sitting on the other side of his desk was quite capable of reminding him that the Psychological Service, once it had been put on an assignment, did not need the consent of an Outposts' assistant secretary for any specific operation. Or anybody else's consent, for that matter. It was one reason that nobody really liked the Service.

But Pilch said pleasantly, "Oh, we've arranged to see that you have the opportunity, of course! We'll be having a conference on the ship, spaceside"—she glanced at her timepiece—"four hours from now, for that very purpose. We particularly want to know what Outposts' viewpoint on the matter is."

And that was another reason they were disliked: they invariably did try to get the consent of everyone concerned for what they were doing! It made it difficult to accuse them of being arbitrary.

"Well—" said Duffold. There was really no way for him to avoid accepting the invitation. Besides, while he shared the general feeling of distaste for Psychological Service and its ways, he found Pilch herself and the prospect of spending a half day or so in her company very attractive. The Outposts Station's feminine complement on Palayata, while a healthy lot, hadn't been picked for good looks; and there was something about Pilch, something bright and clean, that made him regret momentarily that she wasn't connected with a less morbid line of work. "Kidnaping and enforced interrogation of a friendly alien on his own world!" Duffold shook his head. "That's being pretty heavy-handed, you know!"

"No doubt," said Pilch. "But you know nobody has been able to persuade a Palayatan to leave the planet, so why waste time trying? We need the ship's equipment for the investigation, and it might be safer if the ship is a long way out from Palayata while it's going on." She stood up. "Will you be ready to

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hop as soon as I've picked up Wintan?"

"Hop? Wintan?" Duffold, getting to his feet, looked startled. "Oh, I see. Wintan's the operator you've had working on the planet. All right. Where will I meet you?"

"Space transport," said Pilch. "Ramp Nineteen. Half an hour from now." She was at the office entrance by then; and he said hurriedly, "Oh, by the way—"

Pilch looked back. "Yes?"

"You've been here two days," Duffold said. "Have they bothered you at all?"

She didn't ask what he meant. "No," she said. Black-fringed gray eyes looked at him out of a face from which every trace of expression was suddenly gone, as she added quietly, "But of course I've had a great deal of psychological conditioning—"

There hadn't been any need to rub that in, Duffold thought, flushing angrily. She knew, of course, how he felt about the Service—how any normal human being felt about it! Wars had been fought to prevent the psychological control of Hub citizens on any pretext; and then, when the last curious, cultish cliques of psychologists had been dissolved, it had turned out to be a matter of absolute necessity to let them resume their activities. So they were still around, with their snickering questioning of the dignity of Man and his destiny, their eager prying and twisted interpretations of the privacies and dreams of the mind. Of course, they weren't popular! Of course, they were limited now to the operations of Psychological Service! And to admit that one had, oneself—

Duffold grimaced as he picked up the desk-speaker. He distributed sparse instructions to cover his probable period of absence from the Station, and left the office. There wasn't much time to waste, if he wanted to keep within Pilch's half-hour limit. In the twelve weeks he had been on Palayata, he had avoided direct contact with the natives after his first two or three experiences with the odd emotional effects they produced in human beings. But since he had been invited to the Service conference, it seemed advisable to confirm that experience once more personally.

The simple way to do that was to walk out to Ramp 19, instead of taking the Station tube.

The moment he stepped outside the building, the remembered surges of acute uneasiness came churning up in him again. The port area was crowded as usual by sightseeing Palayatans. Duffold stopped next to the building for a few moments, watching them.

The uneasiness didn't abate. The proximity of Palayatans didn't affect all humans in the same way; some reported long periods of a kind of euphoria when around them, but that sensation could shift suddenly and unaccountably to sharp anxiety and complete panic. Any

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one of several dozen drugs gave immunity to those reactions; and the members of the Station's human personnel whose work brought them into contact with the natives were, therefore, given chemical treatment as a regular procedure. But Duffold had refused to resort to drugs.

He started walking determinedly toward the ramp area, making no attempt to avoid the shifting streams of the Palayatan visitors. They drifted about in chattering groups, lending the functional terminal an air of cheerful holiday. If his jangling nerves hadn't told him otherwise, Duffold could have convinced himself easily that he was on a purely human world. Physically, Palayatans were humanoid to the nth degree, at least as judged by the tolerant standards of convergent evolution. They also loved Hub imports, which helped strengthen the illusion. Male and female tended to wander about their business in a haze of Hub perfumes; and at least one in every five adults in sight wore clothes of human manufacture.

But Duffold's nerves were yammering that these creatures were more alien than so many spiders—their generally amiable attitude and the fact that they looked like human beings could be only a deliberate deception, designed to conceal some undefined but sinister purpose. He broke off that unreassuring line of thought, and clamped his mind down purposefully on a more objective consideration of the odd paradoxes presented by these pseudo-people. Palayatans were even more intrigued, for example, by the Hub humans' spectacular technological achievements than by Hub styles and perfumes. Hence their presence in swarms about the Station where they could watch the space transports arrive and depart. But, in twelve years, they hadn't shown the slightest inclination to transplant any significant part of Hub technology to their own rather rural though semimechanized civilization.

At an average I.Q. level of seventy-eight in the population, that wasn't surprising, of course. What was not only surprising but completely improbable, when you really considered it, was that they had not only developed a civilization at all, but that it had attained a uniform level everywhere on the planet.

It simply made no sense, Duffold thought bitterly. Outposts' sociological experts had made the same comment over a year ago, when presented with the available data on Palayata. They had suggested either a detailed check on the accuracy of the data, or a referral of the whole Palayatan question to Psychological Service.

The data had been checked, exhaustively. It was quite accurate. After that, Outposts had had no choice—

"My, you're perspiring, Excellency!" Pilch said, as he stepped up on the platform of Ramp

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19. "This is Wintan. You've met before, I believe. But you really needn't have hurried so!" She glanced at her timepiece. "Why, you're hardly even two minutes late!"

Wintan was a stocky fair-haired man, and Duffold did recall having met him some months before, when his credentials—indicating a legitimate scholarly interest in sociology—were being checked at the Station.

They shook hands, and Duffold turned to greet the other man.

Only—it wasn't a man.

Mentally, Duffold recoiled in a kind of frenzy. Physically, he reached out and clasped the elderly Palayatan's palm with a firm if clammy grip, shook it twice and dropped it, his mouth held taut in what he was positive was an appalling grin. Wintan was saying something about, "Albemarl . . . guide and traveling companion—" Then Pilch tapped Duffold's shoulder.

"The records you sent by tube have arrived, Excellency! Perhaps you'd better check them."

Gratefully, he followed her into the ship. Inside the lock, she stopped and looked at him quizzically. "Hits you pretty hard, doesn't it?" she murmured. "Great Suns, why don't you take one of those drugs?"

Duffold mopped his brow. "Don't like the idea," he said stubbornly. He indicated the two outside the lock. "Don't tell me you got a volunteer for the investigation?"

Pilch's gleaming black hair swung about her shoulders as she turned to look. "No," she smiled. "Albemarl came along to see Wintan off. You've been honored, by the way! He's an itinerant sage of sages among Palayatans—I.Q. one hundred and nine! He and Wintan have been working together for months. Of course, Wintan's immune to the emotional reactions—"

"I see," Duffold said coldly. "No doubt he's also had thorough psychological conditioning?"

Pilch grinned at him. "Not many," she said, "have had as much!"

The Psychology Service ship that swallowed up the transport a few hours later was a camouflaged monstrosity moving along with the edge of an asteroid flow halfway across the system. For all practical purposes, it looked indistinguishable from the larger chunks of planetary debris in its neighborhood, and from its size, it might have had a complement of several thousand people. Duffold was a little surprised that out of that potential number, only five Service members attended the conference, two of whom were Wintan and Pilch. It suggested an economy and precision in organization he had somehow failed to expect here.

The appearance of Buchele, the senior commander in charge of the conference, was almost shocking. He had the odd, waxy skin and cautious motion of a man on whom

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rejuvenation treatments had taken an incomplete effect, but there was no indication of the mental deterioration that was supposed to accompany that condition. His voice was quick, and he spoke with the easy courtesy of a man to whom command was too natural a thing to be emphasized. He introduced Cabon, the ship's captain, a tall man of Pilch's dark slender breed, who said almost nothing throughout the next few hours, and a red-haired woman named Lueral who was, she said, representing Biology Section. Then the conference was under way with a briskness that made Duffold glad he had decided to bring Outposts' full records on Palayata along for the meeting.

They went over the reasons why Outposts was interested in maintaining a Station on Palayata. They were sound reasons: Palayata was a convenient take-off point for the investigation and control of an entire new sector of space, the potential center of a thousand-year, many-sided project. Except for the doubtful factor of the natives, it was as favorable for human use as a world could be expected to become without a century-long conditioning program. The natives themselves represented an immediate new trade outlet for Grand Commerce, whose facilities would make the project enormously less expensive to Government than any similar one on a world that did not attract the organized commercial interests.

Buchele nodded. "Assuming, Excellency, that the Service might be able to establish that the peculiarities of the Palayatan natives are in no way dangerous to human beings, but that the emotional disturbances they cause will have to continue to be controlled by drugs—would Outposts regard that as a satisfactory solution?"

Duffold was convinced that under the circumstances Outposts would be almost tearfully thankful for such a solution, but he expressed himself a little more conservatively. He added, "Is there any reason to believe that they actually are harmless?"

Buchele's dead-alive face showed almost no expression. "No," he said, "there isn't. Your records show what ours do. The picture of this Palayatan culture isn't fully explainable in the terms of any other culture, human or nonhuman, that we know of. There's an unseen controlling factor—well, call it 'X'. That much is almost definitely established. With the information we have, we could make a number of guesses at its nature; and that's all."

Duffold stared bleakly at him. No one in Outposts had cared to put it into so many words, but that was what they had been afraid of.

Buchele said softly, "We have considered two possible methods of procedure. With your assistance, Excellency, we should like to decide between them now."

With his assistance! Duffold became suddenly enormously wary.

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"Go ahead, commander," he requested affably.

"Very well. Let's assume that 'X' actually is a latent source of danger. The section of your records covering the recent deaths of two human beings on the planet might suggest that the danger has become active, but there is no immediate reason to connect those deaths with 'X'."

Duffold nodded hesitantly.

"The point that the Service and, I'm sure, Outposts are most concerned with," the gentle voice of the dead-alive man went on, "is that there is absolutely no way of estimating the possible extent of the assumed danger. As we sit here, we may be members of a race which already has doomed itself by reaching out for one new world that should have been left forever untouched. On the basis of our present information, that is exactly as possible as that the Palayatan 'X' may turn out to be a completely innocuous factor. Where 'X' lies on the scale between those two possibilities can almost certainly be determined, however. The question is simply whether we want to employ the means that will determine it."

"Meaning," said Duffold, "that the rather direct kind of investigation I understand you're planning—kidnaping a native, bringing him out to this ship and subjecting him to psychological pressures—could start the trouble?"

"It might."

"I agree," Duffold said. "What was the other procedure?"

"To have Outposts and Grand Commerce withdraw all human personnel from Palayata."

"Abandon the planet permanently?" Duffold felt his face go hot.

"Yes," said Buchele.

Duffold drew a slow breath. A spasm of rage shook through him and went away. "We can't do that, and you know it!" he said.

Lusterless eyes hooded themselves in the waxy face. "If you please, Excellency," Buchele said quietly, "there is nothing in the records given us by your Department to indicate that this is an impossibility."

It was true enough. Duffold said sourly, "No need to underline the obvious! We're committed to remain on Palayata until the situation is understood. If there is no danger there, or only ordinary danger —nothing that reaches beyond the planet itself—we can stay or not as we choose. But we can't leave, now that we've brought ourselves to the attention of this 'X' factor, before we know whether or not it constitutes a potential danger to every human world in the galaxy. We can't even destroy the planet, since we don't know whether that would also destroy 'X,' or simply irritate it!"

"Is the destruction of Palayata being seriously considered?" the Service man said.

"Not at the moment," Duffold said grimly.

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For the first time then, Buchele shifted his glance slowly about at the other Service members. "It seems that we are in agreement so far," he said, as if addressing them. He looked back at Duffold.

That was when the thought came to Duffold. It startled him, but he didn't stop to consider it. He said, "My Department obviously has been unable to work out a satisfactory solution to the problem. I'm authorized to say that Outposts will give the Service any required support in solving it, providing I'm allowed to observe the operation."

There was a momentary silence. It was bluff, and it wasn't fooling them; but the Service was known to go to considerable lengths to build up good will in the other Departments.

Pilch said suddenly, "We accept the condition—with one qualification."

Duffold hesitated, surprised. Buchele's gaze was on Pilch; the others seemed to be studying him reflectively, but nobody appeared to question Pilch's acceptance. "What's the qualification?" he asked.

"We should have your agreement," she said, "that you will accept any safety measures we feel are required."

"I assume those safety measures are for my benefit," Duffold said gravely.

"Well, yes—"

"Why," said Duffold, "in that case I thank you for your concern. And, of course, you have my agreement."

The others stirred and smiled. Pilch looked rueful. "It's just that—"

"I know," Duffold nodded. "It's just that I haven't had any psychological conditioning."

Pilch was called from the conference room immediately afterwards. This time Duffold was not surprised to discover that she appeared to be in charge of the actual kidnaping project and that she was arranging to include him in the landing party. There seemed to be a constant easy shifting of authority among these people which did not correspond too well with the rank they held.

Others came in. He began to get a picture of unsuspected complexities of organization and purpose within this huge, ungainly ship. There was talk of pattern analysis and factor summaries at the table at which Buchele remained in charge; and Duffold stayed there, since they were dealing with material with which he was in part familiar. It appeared that Wintan, the Service operator who had been working planetside on Palayata, had provided the ship's Integrators with detailed information not included in previous reports; and the patterns were still being revised. So far, Buchele seemed to feel that the revisions indicated no significant changes.

Somebody came to warn Duffold that the landing operation was to

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get underway in eighty minutes. He hurried off to contact the Outposts Station on Palayata and extend the period he expected to be absent.

When he came back, they were still at it—

There seemed to be no permanent government or permanent social structure of any sort on Palayata; not even, as a rule, anything resembling permanent family groups. On the other hand, some family groups maintained themselves for decades —almost as if someone were trying to prove that no rule could be applied too definitely to the perverse planet! Children needing attention attached themselves to any convenient adult or group of adults and were accepted until they decided to wander off again.

There were no indications of organized science or of scientific speculation. Palayatan curiosity might be intense, but it was brief and readily satisfied. Technical writings on some practical application or other of the scientific principles with which they were familiar here could be picked up almost anywhere and were used in the haphazard instruction that took the place of formal schooling. There wasn't even the vaguest sort of recorded history, but there were a considerable number of historical manuscripts, some of them centuries old and lovingly preserved, which dealt with personal events of intense interest to the recorder and of very limited usefulness to his

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researcher. It had been the Hub's own archeological workers who eventually turned up evidence indicating that Palayata's present civilization had been drifting along in much the same fashion for at least two thousand years and perhaps a good deal longer.

Impossible . . . impossible . . . impossible—if things were what they seemed to be!

So they weren't what they seemed to be. Duffold became aware of the fact that by now Buchele and Wintan and he were the only ones remaining at that table. The others presumably had turned their attention to more promising work; and refreshments had appeared.

They ate thoughtfully until Duffold remarked, "They're still either very much smarter than they act—smarter than we are, in fact—or something is controlling them. Right?"

Buchele said that seemed to be about it.

"And if they're controlled," Duffold went on, "the controlling agency is something very much smarter than human beings."

Wintan shook his short-cropped blond head. "That wouldn't necessarily be true."

Duffold looked at him. "Put it this way," he said. "Does the Service think human beings, using all the tricks of your psychological technology, could control a world to the extent Palayata seems to be controlled?"

"Oh, certainly!" Wintan said cheerfully; and Buchele nodded. "Given one trained operator to approximately every thousand natives, something quite similar could be established," the senior commander said drily. "But who would want to go to all that trouble?"

"And keep it up for twenty centuries or so!" Wintan added. "It's a technical possibility, but it seems a rather pointless one."

Duffold was silent for a moment, savoring some old suspicions. Even if the Service men had a genuine lack of interest in the possibilities of such a project, the notion that Psychology Service felt it was capable of that degree of control was unpleasant. "What methods would be employed?" he said. "Telepathic amplifiers?"

"Well, that would be one of the basic means, of course," Wintan agreed. "Then, sociological conditioning—business of picking off the ones that were getting too bright to be handled. Oh, it would be a job, all right!"

Telepathic amplifiers — Outposts was aware, as was everyone else, that the Service employed gadgetry in that class; but no one outside the Service took a very serious view of such activities. History backed up that opinion with emphasis: the psi boys had produced disturbing effects in various populations from time to time, but in the showdown the big guns always had cleaned them up very handily. Duffold said hopefully, "Does it seem to be

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telepathy we're dealing with here?"

Wintan shook his head. "No. If it were, we could spot it and probably handle whoever was using it. You missed that part of the summary, Excellency! Checking for tele-impulses was a major part of the job I was sent to do." He looked at Buchele, perhaps a trifle doubtfully. "Palayatans appear to be completely blind to any telepathic form of approach; at least, that's the report of my instruments."

"Or shut-off," Buchele said gently.

"Or shut-off," Wintan agreed. "We can't determine that with certainty until we get our specimen on board. We know the instruments would have detected such a resistance in any human being."

Buchele almost grinned. "In any human being we've investigated," he amended.

Wintan looked annoyed. From behind Duffold, Pilch's voice announced, "I'll be wanting his Excellency at Eighty-two Lock in"—there was something like a millisecond's pause, while he could imagine her glancing at her timepiece again—"seventeen minutes. But Lueral wants him first."

As Duffold stood up, she added, "You two had better come along. Biology has something to add to your discussion on telepathy."

"Significant?" Buchele asked, coming stiffly to his feet.

"Possibly. The Integrators should finish chewing it around in a few more minutes."

Duffold had been puzzling about what Lueral and the Biology Section could be wanting of him, but the moment he stepped out of a transfer lock and saw the amplification stage set up, with a view of a steamy Palayatan swamp floating in it, he knew what it was and he had a momentary touch of revulsion. The incident with the keff creature, which had cost the lives of two Outposts investigators, had been an unlovely one to study in its restructure; and he had studied it carefully several times in the past few days, in an attempt to discover any correlation with the general Palayatan situation. He had been unsuccessful in that and, taking the seat next to the stage that was indicated to him, he wondered what Biology thought it had found.

Lueral, the red-headed woman who had attended the earlier part of the general conference, introduced him to a fat, elderly man, whose name Duffold did not catch, but who was Biology's Section Head. He was operating the amplifier and remained in his seat. Lueral said into the darkened room:

"This is the record of an objective restructure his Excellency brought shipward with him. The location of the original occurrence was at the eastward tip of Continent Two; the date, one hundred thirty-eight standard, roughly one hundred hours ago. To save time, we would like his Excellency to give us a brief explanation of the circumstances."

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Duffold cleared his throat. "The circumstances," he said carefully, "are that we have investigators working in that area. Ostensibly, they are archeologists. Actually, they're part of an Outposts' project, checking the theory that Palayata is operating under some kind of secret government. There is a concentration of the deserted settlements we find all over the planet around those swamps. The two men involved in the restructure were working through such a settlement—or supposed to be working through it—when the accident occurred."

He added, "If it was an accident. I brought the record along because of the possibility that it was something else."

The Section Head said in a heavy voice, "The restructure appears to have been made within two hours after the actual incident."

"A little less than two hours," Duffold agreed. "There were hourly position checks. When the team failed to check in, a restructure heli began to track them. By the time they reached this keff animal, some natives already had killed it—with a kind of harpoon gun, as the restructure shows. Some portions of the bodies of our investigators were recovered."

"Had the natives observed the incident?" Lueral inquired.

"They said they had—too far off to prevent it. They claim they kill a keff whenever they find one, not because they regard them as a danger to themselves but because they are highly destructive to food animals in the area. They hadn't realized a keff might also be destructive to human beings."

The Section Head said, "This is a view of the keff some minutes after the killing of the two men. The promptness with which the restructure was made permits almost limitless detail."

Duffold felt himself wince as the colors in the amplification stage between them blurred and ran briefly and cleared again. The keff appeared, half-submerged in muddy water, a mottled green and black hulk, the eyeless head making occasional thrusting motions, with an unpleasant suggestion of swallowing.

"Weight approximately three tons," said the Section Head. "The head takes up almost a third of its length. Motions very slow. Normally, this would indicate a vegetarian or omnivorous animal with a limitless food supply, such as these mile-long swamp stretches would provide. Possibly aggressive when attacked, but not dangerous to any reasonably alert and mobile creature."

He added, "However, we were able to pick up tele-impulses at this point, which indicate that the natives' description of its food habits are correct. I suggest using teldampers. The impulses are rather vivid."

Pilch's voice said, "Hold still!" behind Duffold, and something like

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a pliable ring slipped down around his skull. Soft clamps fastened it here and there, and then he was aware of her settling down in the chair beside him. Her whisper reached him again, "If you don't like what you're getting, say so! They don't really need you for this."

Duffold made a grunting sound, indicating complete contentment with his situation and a desire not to be disturbed, but not entirely turning down the suggestion. There were crawling feelings along his spine.

He felt good. He felt drowsy but purposeful, because now there were only a few more steps to go, and then the great pink maw would open before him, and he could relax right into it. Relax and—

He jerked upright in his chair, horror prickling through his nerves. Pilch was tapping his arm.

"Outside!" she whispered. "Keep the damper on." They moved through the dim room; a door clicked ahead of Duffold, then clicked again behind him, and light flooded around them.

He pulled the tel-damper off his head like some small, unclean, clinging animal. *"Whew!"* he breathed. "Should have taken your advice, I think!"

"Well, you didn't know. *We* should have thought of it. There are ways of letting stuff like that come at you, and you—"

"Don't say it," he warned. "I'm learning my limitations." He was silent a moment. "Was that how it felt to them?" He described his sensations.

"They felt something like that," she said. "You gave the impulses your individual interpretations, of course, because you'd seen the restructure and knew what the keff was like. Cabon will be out in a moment, by the way. They got the Integrators' report back on this. I gather there's nothing definite enough in it to change our plans."

"I see," Duffold said absently. Mentally, he was reliving that section of the restructure in which the two investigators had come walking and wading right up to the keff, looking about as if searching for something, and apparently not even aware of each other's presence. Then they had stood still while the huge head came slowly up out of the water before them—and the wet, pink maw opened wide and slapped shut twice.

Cabon stepped out of the room behind them. He grinned faintly. "Raw stuff," he remarked. "You've got a fine restructure team, Excellency."

"Any delays indicated?" Pilch inquired.

"No. You'd better go ahead on schedule. It's almost certain we'll still need our average Palayatan—and the one we've got spotted isn't going to hold still for us forever."

Yunnan, the average Palayatan, had finished the satisfactory third day of his solitary camping hike

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with a satisfactory meal composed largely of a broiled platterful of hard-shelled and hard-to-catch little water creatures, famed for their delicacy. The notion of refreshing his memory of that delicacy had been in his mind for some weeks and had finally led him up to this high mountain plateau and its hundreds of quick, cold streams where they were to be found at their best.

Having sucked out the last of the shells and pitched it into his camp fire, he sat on for a while under the darkening sky, watching the stars come out and occasionally glancing across the plateau at the dark, somber mass of the next mountain ridge. Two other camp fires had become very distantly visible there, indicating the presence of other soqua spearers. He would stay here two more days, Yunnan thought, and then turn back, towards the valleys and the plain, and return to his semi-permanent house in his semi-permanent settlement, to devote himself again for a while to his semi-permanent occupation of helping local unbannut-growers select the best seeds for next season's crop.

It was all a very pleasant prospect. Life, Yunnan told himself, with a sense of having summed it up, was a pretty good thing! It was a conclusion he had come to before under similar circumstances.

Presently he rebuilt the fire, stretched out on some blankets close to it and pulled a few more blankets on top of him. He blinked up at the stars a few more times and fell sound asleep.

Far overhead, a meteor that was not a meteor hit the atmosphere, glowed yellow and vanished. A survey heli of the Hub Station's Planetary Geographers outfit, which had been moving high and unobtrusively above the plateau all day, came in closer to a point almost directly above Yunnan's camp, remained there a few minutes and moved off again across the plateau and on beyond the mountain ridges to the east.

A dark spherical body, the size of a small house, sank swiftly and silently toward the plateau and came to a halt finally a hundred yards above Yunnan's camp and a little more than that to one side of it. Presently a breeze moved from that direction across the camp, carrying traces of a chemical not normally found in such concentration in Palayata's air. Yunnan inhaled it obligingly. A few minutes later, the breeze grew suddenly into a smooth, sustained rush of air, like the first moan of an approaching storm. Sparks flew from the fire, and leaves danced out of the trees. Then the wind subsided completely, and three people came walking into the camp. They bent above Yunnan.

"Perfect reaction!" Pilch's voice said. She straightened and glanced up. The sperical object had come gliding along at tree-top level behind them and was now stationed directly overhead. Various and sun-

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dry clicking, buzzing and purring sounds came out of its open lock. "Take them two or three more minutes to get a complete reproduction," she remarked. "Nothing to do but wait."

Duffold grunted. He was feeling uncomfortable again, and not entirely because of the presence of a Palayatan. Pilch had explained what had happened to Yunnan; the patterns of external sensory impressions that had been sifting into his brain at the moment the trace-chemical reached it through his blood stream were fixed there now, and no new impressions were coming through. He would remain like that, his last moment of sleep-sensed external reality extending itself unchangingly through the hours and days until the blocking agent was removed. What worried Duffold was that the action was a deliberate preliminary prod at the mysterious "X" factor, and if "X" felt prodded, there was no telling at all just how it might respond.

He looked down at their captive. Yunnan certainly looked quietly asleep, but the mild smile on his humanoid features might have expressed either childlike innocence or a rather sinister enjoyment of the situation, depending on how you felt about Palayatans.

And assuming Yunnan was harmless, at least for the moment, was somebody—or something—else, far off or perhaps quite close in the thickening night around them, aware by now that untoward and puzzling things were going on in a Palayatan mind?

Duffold knew they were trying to check on that, too. A voice began murmuring presently from one of the talkie gadgets Pilch wore as earrings. When it stopped, she said briefly, "All right." And then, to Duffold, "Not a pulse coming through the tele-screens that wouldn't be normal here! Just animals—" She sounded disappointed about it.

"Too bad!" Duffold said blandly. His nerves unknotted a trifle.

"Well, it's negative evidence anyway!" Pilch consoled him. The voice murmured from the same earring again, and she said, "All right. Put down the carrier then!" and to her two companions, "They're all done in the shuttle. Let's go."

A grav-carrier came floating down through the dark air toward them, and the crewman who had accompanied them into the camp began to extinguish the fire. He was conscientious and thorough about it. Pilch stepped up on the carrier. Duffold looked at her, at the busy crewman, and at Yunnan. Then he set his teeth, wrapped the Palayatan up in his blankets, picked him up and laid him down on the carrier.

"Hm-m-m!" said Pilch. "Not bad, Excellency!"

Duffold thought a bad word and hoped she wasn't being telepathic.

"Of course not!" said Pilch, reaching up for the earring that hadn't come into noticeable use so

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far. She began to unscrew it. "Besides, I'm shutting off the pick-up right now, Excellency—"

Almost two hours later, Yunnan awakened briefly. He blinked up at the familiar star-patterns overhead, gazed out across the plateau and noted that one of the camp fires there had gone out. Thus reminded, he yawned and scratched himself, stood up and replenished his own fire. Then he lay down again, listened for a half-minute or so to the trilling night-cries of two small tree creatures not far away, and drifted back to sleep.

"He's completely out of the sensory stasis now, of course," Wintan explained to Duffold as the view of Yunnan's camp faded out before them. "How did you like the staging job?"

Duffold admitted it was realistic. He was wondering, however, he added, what would have happened if the Palayatan had decided to go for a stroll and walked off the stage?

"Well," Wintan said reflectively, "if he'd done that, we would have known he was ignoring the five or six plausible reasons against doing it that were planted in his awareness. In that case, we could have counted on his being an individual embodiment of the 'X' factor, so to speak. The staff was prepared for the possibility."

Duffold knew that Psychological Service as such was, as a matter of fact, prepared for the possibility that they had hauled a super-being on board which conceivably could destroy or take control of this huge ship—and distant weapons were trained on the ship to insure that it wouldn't be under alien control for more than an instant. Even more distantly, out in the nothingness of space somewhere, events on the ship were being subjected to a moment to moment scrutiny and analysis.

Nor was *that* all. The Outposts patrol ships at Palayata had been relieved from duty by a Supreme Council order from the Hub; and, in their places, heavily armed cruisers of a type none of the patrol commanders could identify had begun to circle the planet.

"They won't break up Palayata unless they have to, of course!" Cabon had said, in reporting that matter to Duffold. "But that's no worry of ours at the moment. Our job is to trace out, record and identify every type of thought, emotion and motivation that possibly could go ticking through this Yunnan's inhuman little head. If we find out he's exactly what he seems to be, that eliminates one possible form of 'X'."

And if Yunnan was something other than the not too intelligent humanoid he seemed to be, they had "X" neatly isolated for study. Whether or not they completed the study then depended largely on the nature of the subject.

Rationally, Duffold couldn't disagree with the method. It was drastic; the casually icy calculation be-

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hind the preparations made by the Service had, in fact, shocked him as nothing else had done in his life. But, at one stage or another, it would bring "X" into view. If "X" was both hostile and more than a match for man, man at least had avoided being taken by surprise. If "X" was merely more than a match for man—

"Mightn't hurt us at all to learn how to get along with our superiors for a while," Wintan had observed thoughtfully.

It was a notion Duffold found particularly difficult to swallow.

He had noticed, in this last hour while they completed their preparations to invade the Average Palayatan's mind, occasional traces of a tingling excitement in himself—something close to elation. By and by, it dawned on him that it was the kind of elation that comes from an awareness of discovery.

He was engaged in an operation with the most powerful single organization of the Hub Systems. The despised specialists of Psychology Service, the errand boys of the major Departments, were, as a matter of fact, telling everyone, apparently including the Hub's Supreme Council, just what should be done about Palayata and how to do it.

Probably, it hadn't always been that way, Duffold decided; but the regular Departments of the Hub were getting old. For a decade, Outposts—one of the most brisk of the lot—had been gathering evidence that Palayatan civilization wasn't so much quaint as incomprehensible. For an equal length of time, it had been postponing recognition of the fact that the incomprehensibility might have a deadly quality to it—that, quite possibly, something very strange and very intelligent was in concealment on Palayata, observing human beings and perhaps only tolerating their presence here for its unknown purposes.

Even after the recognition had been forced on it, the Department had been unwilling to make any move at all on its own responsibility, for fear it might make the wrong one. Instead, it called in Psychology Service—

For the same reason that Psychology Service always was called in when there was an exceptionally dirty and ticklish job to be done—the Service People showed an unqualified willingness to see any situation exactly as it was and began dealing with it immediately in the best possible manner, to the limits of human ability. It was an attitude that guaranteed in effect that any problem which was humanly resolvable was going to get resolved.

The excitement surged up in Duffold again. And that, he added to himself, was why they didn't share the normal distaste for the notion of encountering a superior life form. The most superior of life forms couldn't improve on that particular attitude! Here or elsewhere, the Service eventually might be defeated, but it could never be outclassed.

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He wondered at that difference in organizations that were equally human and decided it was simply that the Service now attracted the best in human material that happened to be around. At other times in history, the same type of people might have been engaged in very different activities—but they would always be found moving into the front ranks of humanity and moving out of the organizations that were settling down to the second-rate job of maintaining what others had gained.

As for himself—well, he'd gone fast and far in Outposts. He knew he was brainier than most. If it took some esoteric kind of mental training to get himself into mankind's real front ranks, he was going to take a look at it—

Providing, that was, that the lives of everyone on the ship didn't get snuffed out unexpectedly sometime in the next few hours!

Wintan: Pilch, your lad has just bucked his way through simultaneously to the Basis of Self-Esteem and the Temptations of Power and Glory! I'm a little in awe of him. What to do?

Pilch: Too early for a wide-open, I think! It could kill him. If we tap anything, we're going to have trouble. Buchele isn't—

Cabon: Make it wide-open, Wintan. My responsibility.

Pilch: No!

Voice from Somewhere Far Out: Agreement with Cabon's decision. Proceed!

Wintan had left the pick-up room for the time being; and Duffold had it all to himself.

It was an odd place. Almost the most definite thing you could say about it was that it was somewhere within the vast bulk of the Service ship. Duffold sat in something like a very large and comfortable armchair with his feet up on a cushioned extension; and so far as he could tell, the armchair might have been floating slowly and endlessly through the pale-green, luminous fog which started about eight feet from his face in every direction. The only other thing visible in the room was another chair off to his right, in which Wintan had been sitting. Even the entrance by which they had come in was indetectable in the luminosity; when Wintan left, he appeared to vanish in cool green fire long before he reached it.

There wasn't much more time before the work on the captured Palayatan began, and Duffold started running the information he'd been given regarding the operation and his own role as an observer through his mind. Some of the concepts involved were unfamiliar; but, on the whole, it sounded more comprehensible than he had expected. They were acting on the assumption that, with the exception of the "X" factor, the structure of a Palayatan's mental personality was similar to the human one. They reacted to out-

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side stimuli in much the same way and appeared to follow the same general set of basic motivations.

It was already known that there were specific differences. The Palayatan mind was impermeable to telepathic impulses at the level of sensory and verbal interpretations, which was the one normally preferred by human telepaths when it could be employed, since it involved the least degree of individual garbling of messages. Palayatans, judging by the keff creature's inability to affect them, were also impermeable to telepathed emotional stimuli. In spite of the effect they themselves produced on most untrained humans, it had been demonstrated that they also did not radiate at either of these levels, as against the diffused trickling of mental and emotional impulses normally going out from a human being.

At least, that was the picture at present. It might change when the ship's giant amplifiers, stimulators and microscanners were brought into play upon Yunnan's sleeping brain. If "X" was a concealed factor of the Palayatan's personality, it would show up instantly. In that case, the investigation as such would be dropped, and the Service would switch its efforts into getting "X" into communication. It should at least be possible to determine rather quickly whether or not "X" was hostile and how capable it was of expressing hostility effectively, either here or on the planet.

But if it was found that Yunnan, as he knew himself, was Yunnan and nothing else, the search would drop below the levels of personality toward the routine mechanisms of the mind and the organic control areas. Somewhere in those multiple complexities of interacting structures of life must be a thing that was different enough from the standard humanoid pattern to make Palayata what it was. They had talked of the possibility that the "X" influence, if it was an alien one, did not extend actively beyond the planet. But the traces of its action would still be there and could be interpreted.

Duffold's impressions of the possibilities at that stage became a little vague, and he shifted his attention to a consideration of what Wintan had said regarding himself. There was apparently always some risk involved in an investigation of this kind, not to the subject, but to the investigator.

Or, in this case, to the observer.

The trouble was, according to Wintan, that the human mind—or any other type of mind the Service had studied so far, for that matter—was consciously capable of only a very limited form of experience. "A practical limitation," Wintan had said. "Most of what's going on in the universe isn't really any individual's concern. If he were trying to be aware of it all the time, he couldn't walk across the room without falling on his face. Besides, it would kill him."

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And when Duffold looked questioningly at him, he added, "Did you ever go in for the Sensational Limitations vogue, Excellency?"

"No," Duffold said shortly.

"Well," Wintan acknowledged, "they get a little raw, at that! However, they do show that a humn being can tolerate only a definitely limited impact of emotion—artificially induced or otherwise—at any one time, before he loses awareness of what's going on. Now, the more or less legitimate material the Sensationalists use is drawn from emotions that other human beings have at one time or another consciously experienced, sometimes under extreme stimulation, of course. However, as a rather large number of Sensationalists have learned by now, the fact that a sensation came originally from a human mind doesn't necessarily make its re-experience a safe game for another human being."

He was silent for a moment. "That keff animal," he said then. "You saw it. Can you imagine yourself thinking and feeling like a keff, Excellency?"

Duffold grinned. "I hadn't thought of it," he said. He considered and shook his head. "Probably not too well."

"It appears to be a fairly complicated creature," Wintan said. "Stupid, of course. It doesn't need human intelligence to get along. But it's not just a lump of life responding to raw surges of emotion. There are creatures that aren't much else, a good deal farther down on the scale. They haven't developed anything resembling a calculating brain, and what we call emotion is what guides them and keeps them alive. To be effective guides to something like that, those emotions have to be pretty strong. As a matter of fact, they're quite strong enough to wreck anything as complex and carefully balanced as a conscious human mind very thoroughly, if it contacts them for more than a very short time."

"How do you know?" Duffold inquired.

"So far, our Hub Sensationalists haven't learned how to bottle anything like that," Wintan said. "At least, we haven't run into any indications of it. However, Psychology Service did learn how, since it was required for a number of reasons. In the process, we might have discovered that emotion can kill the body by destroying the mind in a matter of seconds if we hadn't been made aware of the fact a good deal earlier—"

"Yes?" Duffold said politely.

"Excellency," Wintan said, "civilized man is—with good reason, I think—a hellishly proud creature. Unfortunately, his achievements often make it difficult for him to accept that his remote ancestors—and the remote ancestors of every other mobile and intelligent life form we've come across—were, at one period, specks of appetite in the mud, driven by terrors and a brain-

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less lust for survival, ingestion and procreation that are flatly inconceivable to the conscious human mind today."

Duffold laughed. "I'll accept it," he said agreeably.

"In that case," said Wintan, "you might consider accepting that precisely the same pattern is still present in each of our intelligent life forms and is still basically what motivates them as organisms. Self-generated or not, emotions like that can still shock the mind that contacts them consciously in full strength to death. Normally, of course, that's a flat impossibility—our mental structure guarantees that what filters through into consciousness is no more than the trace of a shadow of the basic emotions . . . no more than consciousness needs to guide it into reasonably intelligent conduct and, usually, at any rate, no more than consciousness can comfortably tolerate. But in an investigation of this kind, we'll be playing around the edges of the raw stuff sooner or later. We'll try to keep out of it, of course."

Duffold said thoughtfully that he was beginning to see the reason for safeguards. "What makes it possible for you to get into trouble here?"

"Something like a cubic mile of helpful gadgetry," Wintan said. "It's quite an accomplishment."

"It is," Duffold said. "So it's not all conditioning then. Can you—conditioned—people get along without safeguards?"

Wintan said amiably that to some extent they could. On reflection, it didn't sound too bad to Duffold. The particular type of safeguard that had been provided for him in the pick-up room was to the effect that as he approached an emotional overload, he would be cut out of contact automatically with the events in the ship. Otherwise, he would remain an observer-participant, limited only by his lack of understanding of the progress of the operation.

Wintan: I've given him fair warning, Pilch.

Pilch, grudgingly: There's no such thing in this game! I suppose you did what you could.

Pictures moved now and then through the luminous mist. Some were so distinct that it seemed to Duffold he was looking straight through the bulk of the ship at the scene in question. Most were mere flickers of form and color, and a few a tentative haziness in which a single detail might assume a moment of solidity before the whole faded out.

"Cabon's checking the final arrangements," Wintan said from the chair to Duffold's right.

Duffold nodded, fascinated by the notion that he was observing the projected images of a man's mind, and disappointed that the meaning of much of it apparently was wasted on him. Buchele's waxy face showed up briefly, followed by the picture of a thick-necked

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man whose cheekbones and jaw were framed by a trimmed bristle of red beard.

"Our primary investigators, those two," Wintan said briefly. "The other one's Ringor—head of Pattern Analysis." The mind-machines and their co-ordinators did what they could; they supplied power and analyzed a simultaneous wealth of detail no human mentality could begin to grasp in the same span of time. To some degree, they also predicted the course that should be followed. But the specific, moment to moment turns of the search for "X" were under the direction of human investigators. Eight or nine others would trace the progress of the leading two but would not become immediately involved unless they were needed. Pilch was one of these.

The reconstruction of Yunnan's camp area came gradually into sight now, absorbing the pick-up medium as it cleared and spread about and behind the two observers. Presently, it seemed to Duffold that he was looking down at the sleeping figure near the fire from a point about forty feet up in Palayata's crisp night air. The illusion would have been perfect except for two patches of something like animated smoke to either side of Yunnan. He studied the phenomenon for a moment and was startled by a sudden impression that the swirling vapory lines of one of those patches was the face of the red-bearded investigator. It changed again before he could be sure. He glanced over at Wintan, suspended incongruously in his chair against the star-powdered night.

The Service man grinned. "Saw it, too," he said in a voice that seemed much too loud here to Duffold. "The other one is Buchele—or the projector's impression of Buchele at the moment. They're designed to present what they get in a form that makes some meaning in human perceptions, but they have peculiar notions about those! You'll get used to it."

He was, Duffold decided, speaking of one of the machines. He was about to inquire further when the scene became active.

Something a little like a faint, brief gleaming of planetary auroras . . . then showers of shooting stars . . . played about the horizons. For a moment he forgot he was watching a reconstruction. The lights and colors flowed together and became the upper part of the body of a blond woman smiling down over the distant mountains at the sleeping Palayatan, her hands resting on the tops of the ridges. Briefly, the face blurred into an unpleasantly grimacing mask and cleared again. Then the woman was gone, and in her place was a brightly lit, perfectly ordinary-looking room, in which a man in the uniform of the Service sat at a table.

"What's all this?" Duffold breathed.

"Eh?" Wintan said absently.

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"Oh!" He turned his head and laughed. "Our investigators were tuning in on each other. They've worked together before, but it takes a moment or so— Ah, here we go!"

Duffold blinked. The universe all around them was suddenly an unquiet grayness, a vaguely disturbing grayness because there was motion in it which couldn't be identified. A rapid shifting and flowing of nothing into nothing that just missed having significance for him.

"About as good a presentation as the projector can manage," Wintan's voice said, almost apologetically—and Wintan, too, Duffold noticed now, was invisible in the grayness. He felt uncomfortably isolated. "You're looking at . . . well, it would be our Palayatan's consciousness, if he were awake."

Duffold said nothing. He had been seized by the panicky notion that breathing might become difficult in this stuff, and he was trying to dismiss that notion. A splash of blue, a beautiful, vivid blue, blazed suddenly in the grayness and vanished. "They're moving," Wintan's voice murmured. "Dream level now!"

Breathing *was* difficult! If only that blue would come back—

It came. Duffold gasped with relief, as gray veils exploded about him and a bright blue sky, deep with cloud-banks, spread overhead and all about. Wintan spoke from somewhere, with a touch of concern, "If this is bothering you at all, I can shut you out of it instantly, you know!"

"No," Duffold said. He broke out laughing. "I just discovered I'm not here!"

It was true in a peculiar way. There wasn't a trace of Wintan or himself or of their supporting chairs in sight here. He looked down through empty space where his body should have been and laughed again. But he could still feel himself and the pressure of the chair against him, at any rate; so he hadn't become disembodied.

"Dreams are odd." Wintan's voice sounded as if he might be smiling, too, but the concern hadn't quite left it. "Especially when they're somebody else's. And especially again when that someone isn't human. Incidentally, this is a visual pick-up for you. All you have to do to break it is to close your eyes."

Duffold closed his eyes experimentally and patted the side of the chair. Then he opened them again—

Yunnan's dream had changed in that instant. He was looking down now into a section of a shallow stream, swift-moving and clear, through which a creature like a mottled egg darted behind a silver lure. Another one showed up beyond it, both flashingly quick, propelled by a blurred paddling of red legs.

"Mountain soquas," said Wintan. "Our friend was spearing them

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during the day." His voice sounded thoughtful. "No trace of anything that might indicate 'X', so far. I imagine they'll stimulate a different type of sequence—"

The scene flowed, as he spoke, into something entirely different again. This was, Duffold decided, apparently an angular caricature of a Palayatan town-street, presented in unpleasantly garish colors. Something that was in part a redlegged soqua and in part an extremely stout Palayatan was speaking excitedly to a small group of other Palayatans. The next moment, they had all turned and were staring straight at Duffold. Their eyes seemed to contain some terrible accusation. Involuntarily, he cringed —just as the scene flickered out of existence.

The green luminescence was about them again. From the other chair, Wintan grinned briefly at him.

"Tapped a nightmare layer," he explained. "It woke him up. So our little friends have bad dreams, too, occasionally!" He studied Duffold quizzically. "Did you get the guilt in that one?"

"Guilt?" Duffold repeated.

"He'd been killing soquas," Wintan said. "Naughty thing to do, according to his subconscious, so it punished him." He added, "No luck at all, so far, unless there was something I missed. An orderly, childish mind. No real guile in it—and it does fit the way they look and act!"

"Could it be faked?"

"Well," Wintan said, "*we* couldn't do it. Not to that extent. They'll hit the Deep Downs next, I imagine. Should become more interesting now."

A riot of color blazed up about them—color that was too rich and in meaningless flux and motion, or frozen into patterns that stirred Duffold uncomfortably. Something came to his memory and he turned and spoke in Wintan's direction.

"Yes," Wintan's voice replied, "it's not surprising that it makes you think of some forms of human art. We have a comparable layer." He was silent for a moment. "How do you feel?"

"Slight headache," Duffold said, surprised. "Why?"

"It might affect you that way. Just close your eyes a while. I'll let you know if we run into something significant."

Duffold closed his eyes obediently. Now that his attention was on it, the headache seemed more than slight. He began to massage his forehead with his fingertips. Wintan's voice went on, "It's a nearly parallel complex of mental structures, as one would expect, considering the physical similarities. This particular area originates when the brain's visual centers are developing in the zygote. It's pure visual experience, preceding any outside visual stimulus. Later on, in humans anyway, it can become a fer-

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tile source of art . . . also of nightmares, incidentally." His voice stopped, then resumed sharply, "Buchele's tracing something—there!"

Duffold opened his eyes. Instantly, he had a sensation that *was* pure nightmare—of being sucked forward, swept up and out of his chair, up and into—

The sensation stopped, and a velvety blackness swam in front of him like an intangible screen. He was still in his chair. He drew in a quivering breath. The only reason he hadn't shouted in fright was that he hadn't been capable of making a sound.

"That—!" he gasped.

"Easy," Wintan said quietly. "I've shut you off."

"But that was that keff animal!"

"Something very like it," Wintan said, and Duffold realized that he could see the Service man again now. Wintan was watching something that was behind the area of screening blackness for Duffold, and if he felt any of the effects that had paralyzed Duffold, he didn't show it. He added, "It's very interesting. We'd been wondering about the keff!"

"I thought," Duffold said, "that Palayatans weren't bothered by the animal."

Wintan glanced at him. "Our present Palayatans aren't. Did you notice the stylized quality of that image and the feeling of size—almost like a monument?"

Duffold said shortly that he hadn't been in a frame of mind to observe details. His vulnerability was still irritating. "It looked like a keff to me. Why should it be in this fellow's mind?"

"Ancestral image," Wintan said, "or I miss my guess! And that means—it almost *has* to mean that at one time the Palayatans weren't immune to . . . ah, wait!"

"Something new?" Duffold said quickly.

Wintan seemed to hesitate. "Yes," he said.

"Then cut me in again. I don't want to miss more than I have to."

For a moment, Duffold thought Wintan hadn't responded. Then he realized that the blackness before him wasn't quite what it had been a few seconds ago.

He stared uncomprehendingly. An eerie shiver went over him. "What's this?" he demanded, his voice unaccountably low.

"Something really new!" Wintan said quietly. "I think, Excellency, that they've found 'X'!"

For the moment, that seemed to have no meaning to Duffold. The pale thing swimming in the dark before them was roughly circular and quite featureless. He had a feeling it was nothing tangible, a dim light—but his hair was bristling at the back of his neck. The thought came to him that if this was what the projectors were making of the thing that had been tracked down, the mind-machines

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were as puzzled as he was. "Something really new—" Wintan had said.

He realized that the thing wasn't alone.

To right and left of it, like hounds cautiously circling a strange beast they had overtaken, moved two lesser areas of light. The human investigators hadn't withdrawn.

They're trying to make contact with it, he thought. And some of the sense of awe and oppression left him. If they could face this strangeness at first hand—

It happened quickly. One of the smaller areas of light moved closer to the large one, hesitated and moved closer again. And something like a finger of brightness stabbed out from the large one and touched the other.

Instantly, there was only blackness. Duffold heard Wintan catch his breath, and started to ask what had happened. He checked himself, appalled.

A face swam hugely before them. It was Buchele's, and it was the face of a personality sagging out of existence. The eyes were liquid, and the mouth slid open and went lax. Across the fading image flashed something sharp and decisive; and Duffold knew, without understanding how he knew it, that Cabon had given a command and that it had been acknowledged.

In the next instant, as the scene of darkness and its pale inhabitant reshaped itself, he knew also by whom the command had been acknowledged.

"No!" he shouted. He was struggling to get up out of the chair, as Wintan called out something he didn't understand. But it was over by then.

Again there had been three areas of light, two small and one large. Again, a small one came gliding in towards the large one; and again light stabbed out to meet it.

This time, it was like a jarring dark explosion all around him. Dazed, Duffold seemed to hang suspended for a moment over a black pit, and then he was dropping towards it. It was, he sensed suddenly, like dropping into a living volcano. Its terrors, stench, and fury boiled up horribly to engulf him.

The office seemed stuffy. Duffold reached back and turned the refresher up a few notches, simultaneously switching the window view to the spaceport section where the shuttles and transports stood ramped. Since he'd got back, that was the only available outside view he'd cared to look at. Except for that guide of Wintan's—Albemarl or whatever his name was—four days ago, no Palayatan ever had been allowed into that area. They hadn't sense enough to insure they would remain un-cindered there.

He noticed the Service transport had landed at Ramp Thirteen. They were punctual, as usual. A few fig-

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ures moved about it, too far off to be recognized. Duffold picked up the sheaf of Service reports from a corner of the desk, flicked through them and hauled out a sheet. There were some points he wanted to refresh his mind on before the coming interview with—well, with whomever it was they'd decided to send down! He hadn't specified Pilch, though he imagined it was the kind of job she would be likely to take on.

He read hurriedly, skipping sections here and there. ". . . Originally, then, it was the class of creatures of which the present-day keff is the only surviving species that forced the divergence in mental development on the proto-humanoids. Their evolutionary response was a shift of the primary center of awareness from the level of sensory interpretation to that of organic control, which has remained a semiautomatic, unconscious area of mind in any similar species. The telepathic bands on which the keff-like carnivores operated could stimulate only the sensory-response areas of the brain. The controlling central mind of the humanoid was no longer affected by them. The continuing inflow of keff-impulses on the upper telepathic bands became a meaningless irritation, and the brain eventually sealed off its receptors to them . . .

"To an observer of the period, it might have seemed that the Palayatan humanoid species now had trapped itself in an evolutionary

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pocket. Animal intelligence must isolate itself from the full effect of the primitive emotional storms of the unconscious if it is to develop rationality and the ability of abstract thought. In doing this, it reduces its awareness of the semiautomatic levels of mind which remain largely in the area of the unconscious. In this case, however, it was losing contact with the level of sensory interpretation which normally is the indicated area of intellectual development. . . . For many hundreds of thousands of years, the Palayatan humanoid remained superficially an animal. His brain was, in fact, continuing to evolve at a rate comparable to the proto-human one; but the increase in consciousness and potential of organization was being absorbed almost entirely by the internal mind to which he as a personality had retreated . . ."

Duffold put that sheet down, shook his head, and selected another one. ". . . The fairly well-developed civilization we now find on Palayata . . . of comparatively recent date . . . The humanoid being with whom we have become familiar conveniently might be regarded as a secondary personality, subordinate to the internal one. However, the term is hardly more justified than if it were applied to the human sympathetic nervous system . . .

"The Palayatan superficial mind has become an increasingly complex structure because the details of its required activities are complex. It has awareness of its motivations, but is not aware that an internal mind is the source of those motivations. It has no understanding of the fact that its individual desires and actions are a considered factor in the maintenance of the planetary civilization which it takes for granted.

"On the other hand, the internal personality, at this stage of its development, is still capable of only a generalized comprehension of the material reality in which it exists as an organism. It employs its superficial mind as an agent which can be motivated to act towards material goals that will be beneficial to itself and its species. By human standards, the goals have remained limited ones since the possibility of achieving them depends on the actual degree of intelligence developed at present by the superficial minds. They are limited again by the internal minds' imperfect concept of the nature of material reality. As an example, the fact that space might extend beyond the surface of their planet has had no meaning to them, though it has been presented as a theoretical possibility by some abstract thinkers . . ."

Duffold shoved the sheets back into the stack. He couldn't argue with the reports or with the Service's official conclusion regarding Palayata, and he didn't doubt that the Hub Departments would accept them happily. So we're dealing with a native race of split person-

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alities this time—no matter, so long as the Service guarantees they're harmless! The emotional disturbance they caused human beings couldn't be changed, unfortunately; but any required close contacts could be handled by drug-fortified personnel.

Everybody was going to feel satisfied with the outcome—except Duffold. He was reaching for another section of the reports when the desk communicator murmured softly up at him.

"Oh!" he said. "Why, yes. Send her right in!"

He studied Pilch curiously after she was seated. Objectively, she looked as attractive as ever, with her long, clean lines and a profile almost too precisely perfect. Otherwise, she stirred no feeling in him this time; and he was a little relieved about that.

"I understand," she said, "that you weren't entirely pleased with our reports?"

"I did have a few questions," Duffold said. "It was very good of you to come. The original reports, of course, have been transmitted to my headquarters."

She nodded briefly.

"Personally," Duffold said hesitantly, "I find all this a little difficult to believe. Of course, I blacked out before the investigation was concluded. The reports simply state what you found, not how you got the information."

"That's right," said Pilch. "How we got it wouldn't mean much to someone who wasn't familiar with our methods of operation. What part can't you believe? That the real Palayatan is so far inside himself that he hardly knows we're around when we meet him?"

"Oh, I'll accept that that's the way it is!" Duffold said irritably. "But how did you find out?"

"One of those inner minds told us," said Pilch. "Not the one inside Yunnan—he was scared to death by the time we got done with him and yelled for help. So another one reached out far enough from the planet to see what was wrong—a colleague of ours, so to speak. At least, he regards himself as a psychologist—a specialist in mental problems."

Duffold shook his head helplessly.

"Well, it's an odd sort of existence, by our standards," Pilch said. "I don't think I'd go for it myself. But they like it well enough." She thought a moment and added, "The feeling I had was as if you were a deep-sea animal, intensely aware of yourself and of everything else in a big, dark ocean all around you. Actually, there was a sort of richness in the feeling. I'd say their life-experience is at least as varied as the average human one."

"What scared Yunnan?" Duffold asked.

"He knew something was wrong. He didn't realize he'd been removed bodily from the planet, but to use our terms, he felt as if he had suddenly grown almost deaf—and in-

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visible. He couldn't understand the other Palayatans very well anymore, and they didn't seem to be too aware of him. And then our investigators suddenly were *talking* to him! Do you know what human beings seem like to those inside Palayatans? Something like small sleepy animals that have mysteriously turned up in their world. I imagine our degree of organic intelligence can't be too impressive at that! So when two of those animals began to address him—conscious minds like himself, but *not* his kind of mind—Yunnan panicked."

"So he killed Buchele," Duffold said.

Pilch said impassively, "It would be correct to say that Buchele killed himself. There were sections of his mind that he had never been able to accept as part of himself. Buchele was an idealist in his opinion of himself, and in Service work that's a risk. Of course, he had a right to insist on taking that risk if he chose."

"Exactly what did happen to him?" Duffold said carefully.

"The Palayatan jolted a sealed-off section of Buchele's mind into activity, and Buchele met its impact in full consciousness. It killed him."

"No matter how you phrase it," Duffold said, "it seems that one human being, at least, has been murdered by a Palayatan!"

She shook her head. "Not if murder is in the intention. Because it was only trying to frighten Buchele off. It's the way they deal with another mind that is annoying them."

"Frighten him off?" Duffold repeated incredulously.

"Look," Pilch said, "every time you felt that anxiety you mentioned, you'd been jolted by some Palayatan in exactly the same way! Every human being, every intelligent life-form we know about, keeps that stuff out of awareness by layers and layers of mental padding. Our heavy-duty civilized emotions are just trickles of the real thing! It takes the kind of power equipment we have on the ship to drive ourselves down consciously, with full awareness, to the point where we're close enough to it that a Palayatan could topple us in. So it can't ever happen on the planet."

Duffold looked like a man who has suddenly come upon a particularly distasteful notion.

"Some people reported euphorias!" he said.

Pilch nodded. "I didn't mention that because I knew you wouldn't care for it. Well, I told you they've been regarding us as some sort of small strange animal. Some of them become quite fond of the little beasts. So they stimulate us pleasantly—till we take a nip out of them or whatever it is we do that annoys them. Tell me something," she went on before he could reply, "just before you blacked out during the investigation, what were the sensations you hit—terror, self-disgust, rage?"

He looked at her carefully. "Well

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—all of that," he said. "The outstanding feeling was that I was in close contact with something incredibly greedy, devouring . . . foul! I can appreciate Buchele's attitude." He hesitated. "How did it happen that I wasn't aware of what got Buchele?"

"Automatic switch-off for the instant it lasted. It was obvious that it was going over the level of emotional tolerance that had been set for you. We told you there'd be safeguards."

"I see," said Duffold. "Then what about the other thing?"

Pilch looked faintly surprised. "Wintan would have cut you out of it, if he'd had the time," she said. "But obviously you did tolerate it even if you blacked out for a while. That was still well within the safe limit."

Duffold felt a slow stirring of rage. "When you took Buchele's place, it seemed to me that the Palayatan struck at you in the same way he had at Buchele. Is that correct?"

Pilch nodded. "It is."

"But because of your . . . superior conditioning, it didn't disturb you?"

"Not enough to keep me from making use of it," Pilch said.

"In what way?"

"I opened it up on the Palayatan. That," said Pilch, "was when he yelled for help. But it was too bad you picked it up!"

Duffold carefully traced a large, even circle on the desk top with a fingertip. "And you could accept *that* as being part of your mind?" he said with a note of mild wonder. "Well, I suppose you should be congratulated on such an unusual ability."

She looked a little pale as she walked out of the office. But, somehow, Duffold couldn't find any real satisfaction in that.

Wintan was leaning against the side of the central Outpost building as Pilch came out of the entrance. She stopped short.

"Thought you'd be at the transport," she said.

"I was," Wintan said. "Twelve slightly stunned keffs in good shape have been loaded, and I was making a last tour of the area."

"Albemarl?" she asked as they started walking back to the ramps. "Or the psychologist?"

"Both," Wintan said. "I'd have liked to say good-by to Albemarl, but there's still no trace of the old tramp anywhere. He'd have enjoyed the keff hunt, too! Too bad he had to wander off again."

"How about the other one?"

"Well, there's very little chance he'll actually contact us, of course," Wintan said. "However"—he held his right hand up—"observe the new wrist adornment! If he's serious about it, that's to help him locate me."

She looked at two polished black buttons set into a metal wrist-strap. "What's it supposed to do?"

"Theoretically, it sets up a small

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spot of static on *their* awareness band. Tech hasn't had a chance to test it, of course, but it seems to be working. I've been getting some vaguely puzzled looks from our local friends as I wander about, but that's as much interest as they've shown. How did it go with his Excellency?"

"Satisfactorily, I suppose," Pilch said grudgingly. "No heavy dramatics. But for a while there, you know, that little man had me feeling mighty unclean!"

"Self-defense," Wintan said tolerantly. "Give him time to shake it down. Basically, he already knows it was one of his own little emotional volcanoes he dropped into, not yours. But it'll be a year or two before he's really able to admit it to himself, and meanwhile he can let off steam by sitting around and loathing you thoroughly from time to time."

"I read the Predictor's report on him, too," Pilch said. "I still don't agree it was the right way to handle it."

Wintan shrugged. "Cabon can estimate them! If we'd jolted this one much heavier, it might have broken him up. But if the jolt had been a little too light, he could have buried it permanently away and forgotten about it again. As it is, he knows what's inside him, and eventually he'll know it consciously. When he does, he'll be ready for Service work without qualifications —and that means he won't go out some day like Buchele did!"

They walked on in silence for a while, through the drifting crowds of visiting Palayatans. Assorted Hub perfumes tinged the air, soft voices chattered amiably, faces turned curiously after the passing humans. "What makes you all so sure Duffold will be back?" Pilch said finally. "Even if he realizes what happened, the rap on the nose he got could be discouraging."

"It could be, for someone else," Wintan said. "But there're some you can't keep away, once they learn where the biggest job really is. For his Excellency, the rap on the nose will turn out eventually to have been Stage One of conditioning."

"Well, maybe. But an idealist like that," said Pilch, "always strikes me as peculiar! They never want to look at the notion that the real reason Man rates some slight cosmic approval is that he can act as well as he does, in spite of the stuff he's evolving from."

"Can't really blame them," Wintan remarked. "As you probably discovered in your own conditioning, some of that stuff just isn't good to look at."

"Now there for once," Pilch agreed darkly, "you spoke a fair-sized truth! Incidentally, that static you're spreading doesn't seem to meet with everyone's approval around here. I've been jolted three times in the last ten seconds!"

"Small boy about six steps behind us," Wintan reported. "He's scowling ferociously—but mama's

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leading him off now! Wonder what he made of it consciously?"

"He'll probably grow up with a vague but firmly held notion that Hub humans don't smell good!" Pilch estimated. They were coming up to a long, low wall from which the ramp-ways led into the sunken take-off section. The crowds were thinning out. "Have you noticed anyone acting as if he might conceivably be our psychologist?"

Wintan said he hadn't. "If he's in the area, as he said he would be, he's still got about ten minutes to make up his mind to go space-faring. Let's stop here and give him a last chance to show up before we go out on the ramp!"

They leaned back against the wall surveying passing natives hopefully. "He *was* excited about the idea at first," Wintan said, "but I imagine it seemed like too big a change when he'd had time to think about it. After all, he would have lost contact with all his kind before the ship was out of the system."

Pilch shivered. "Like a man living in a solitary dream for years, listening to the voices of strange entities. Isn't it odd—two intelligent races, physically side by side, but each blocked from any real contact with the other by the fears of its own mind!"

"It needn't have stayed that way!" Wintan said regretfully. "Lord, the things we could have learned! We working down towards his awareness band, and he working up towards ours. Wish we had time to experiment here for a year or so! But the Great God Schedule has got us. It's likely to be a half century before the Service can spare another look at Palayata!"

Pilch glanced at her timepiece. "The same Schedule also says we start moving towards Ramp Thirteen right now, Wintan!"

They moved, reluctantly. As they came up the stairs to the locked platform gate, a lanky figure that had been sitting beside it, stood up without unseemly haste.

Pilch darted a wild glance at Wintan. "Great Suns!" she said as they both came to a stop. Wintan was clearing his throat. "Ah, Albemarl—" His voice sounded shaky. "I greet you!"

"And I greet you, Wintan!" the elderly Palayatan said benignly. "I must ask your forgiveness for not having met you here as I promised, but I have had a very strange experience."

"Ah, yes?" Wintan said.

"Yes, indeed! For forty long years, I have wandered over the face of the world, welcome everywhere because of my great wisdom and the free flow of my advice. When you asked me some time ago whether I would like to enter your ship and go out of the world in it, into that strange emptiness overhead from which you people come, I laughed at you. Because—forgive me again, Wintan—we all think here that it is very foolish to leave a fair and familiar world and the

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comfort of many, many friends, in order, at best and after a long time, to reach another world that cannot be so very different, where friends must be made again. Also, you spoke of risks."

"Yes," Wintan said, "there are always risks, of course."

Albemarl nodded. "But on the night after you left," he said, "I had a dream. A strong voice spoke to me, which I know as the voice of my True Self"—Pilch gulped—"and it told me of a thing I had overlooked. I knew then it was true, but it disturbed me greatly. So for these days and nights I have been wandering about the hills, thinking of what it said. But in the end I have come here with a calm heart to ask whether I may now enter the ship and go wandering with you and your friends through all the years and the strangeness that is beyond the world."

"You may, indeed, Albemarl!" Wintan said.

"And we leave now? I am ready."

"We leave now!" Wintan gave Pilch a look, still incredulous but shining; then he stepped up to the gate and put the ball of his thumb against the lock that would open only to a human pattern.

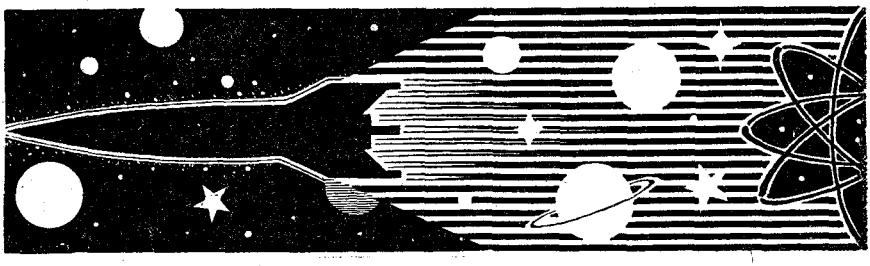
"Albemarl," Pilch said gently, as the gate hissed open, "would you mind very much telling me what the thing was that you had overlooked?"

Albemarl blinked at her benevolently with his somewhat muddy Palayatan eyes. "Why, not at all! It is a simple thing but a great one—that wisdom accepts no limits. So when a wise man hears of a new thing that may be learned, beyond anything he knew before, it may not seem as comforting as the familiar things he knows, but he must learn it or he will never be content."

Wintan had moved back from the gate to let Pilch through. She put her hand on Albemarl's elbow and stepped up to the gate with him. Then she stopped.

"After you, brother!" Pilch said.

THE END



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THE DOORSTOP

A totally inoffensive, completely harmless new thing can—the nature of Man being what it is—be quite deadly; it can destroy you, even though you go on living healthily.

BY R. BRETNOR

Illustrated by Freas

Dr. Cavaness scarcely heard the metallurgist and the chemist reading their detailed technical reports. He tried to look at them, he tried to fasten his attention on their words. But always his glance drifted, to the square, strong face of the Air Force major general sitting across from him, off to the vast industrial landscape of Detroit framed in the window of the Directors' Room, back to the other faces there—back to the thing, the Doorstop, bronze-bright and dumbbell-shaped, isolated in its bell jar, alone on the polished plain of brown mahogany. And always, refusing discipline, his mind shied from close contact with the here and now, where the Doorstop had undeniable

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reality, where these men were gathered with their cold answer to the riddle he did not want to solve.

Occasionally, a fragment of a phrase came through to him—*And when the oxidation rate . . . as yet unanalyzed . . . a rare-earth compound or*—And every fragment sent his mind to seek a refuge in his memories, to find him pictures of a world gardened with all the good, familiar things, a world safe in the narrow limits set by common sense, a world to which the shadow of the Doorstop could never penetrate.

His mind recalled the moment forty years ago when he and Eleanor had found their first kiss floating on the sweet night air, and shared it, there on the cool brick porch, spontaneously. The stars were close. The friendly stars were winking points of light, as small as glowworms, as near, as intimate. Nightfall created them; at daybreak they dissolved. And there had been no need to think of them, of what they really were. Not then. Then there had been no Doorstop.

His mind touched fear, and anger at the fear. Immediately, it flipped the pages of the past, pages of friends and fishing trips, of midnight calls to childbirth, hypochondria, surgery —pages of precious trials and triumphs and routines. That was his life, the busy hours, the days succeeding days, the months, the seasons, the gently-moving years, all compassed by his family, his patients, and his town. That was his world, expanding rarely to include a little of Detroit; more rarely still, three weeks in California or in Canada; and sometimes, unavoidably, admitting through its walls the harsh awareness of wars abroad, of strange barbarities in stranger lands—of dark realities that had to stay unreal.

The voices in the unreal present lectured on, the chemist first, the metallurgist next, using the long-linked words of their technologies. Dr. Cavaness' mind, escaping them, found him the safety of a day when he was twelve, rising excitedly at dawn, mounting his new red bike, whistling his happy dog, riding green-bordered, unpaved roads out to his uncle's farm. He let himself be drawn into that day: there was the calm white house, the barn, the sunlit hill, and there was Uncle Matt shouting hello at him—and Uncle Matt was going to show him where beavers had built themselves a dam across the creek—and—

The picture vanished. Abruptly, cruelly, he was seventeen, and Uncle Matt was dead. The funeral service in the afternoon, the coffin covered with the flowering earth, the solemn, silent supper afterwards—all this was over; he lay awake in bed, sadly and quietly understanding it. Lying there, he thought of how the minister had spoken of eternity. He tried to puzzle out the meaning of the word, tried really hard—and suddenly he seemed to *see* the endless years, innumerable, incomprehensible, receding to a frozen void that strangled sanity. Fear seized him, and anger at the fear, anger at this rude violation of his world by vastnesses less under-

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standable than death. He called on God to drive the mystery out, extinguish it—but God, appallingly, had grown too great, unthinkable remote, as inconceivable as all the wastes of Time. Desperately, then, young Howard Cavaness had wrestled the idea, thrusting it out beyond the wall again, denying its existence to himself—

The scene receded suddenly, surrendering to another, more vivid, stronger still. It was an autumn night a year ago, cold, crystal-clear; and he and Eleanor were driving home after the show, after a dull main feature and a short or two. One of the shorts had been about astronomy, about the giant telescope at Palomar, how it was built and used, and what it saw. The narrator had spoken of the moon, the sun, the planets near and far, of light that reached the earth in seconds, minutes, hours. He had discussed the nearest stars, a few light-years away; the nearest neighboring galaxies, seen as they were a million years before; the myriad island universes each with its own infinity of suns, stretched to the ends of space, a billion years remote—a thousand million years, each single one of which meant six quadrillion miles. To Dr. Cavaness, the numbers had been words and nothing more. He scarcely thought about them as he drove, leaving the glare of neons far behind, turning into the shadowed, winding road that crossed the hill. Finally they reached the crest. He saw the sky. From end to end, it was alive with light.

Somehow, he stopped the car. Just as it had when he was seventeen, the Mystery and its magnitude seized into him. Deep in his soul, his brain, the marrow of his bones, he felt the dreadful distances between the stars.

At the Directors' Table, Dr. Cavaness forced his eyes to open, his clenching hands under its edge to part. Deliberately, he forced himself to look around, to see the general's face, the long-familiar face of young Ted Froberg, his one-time partner's son, the listening faces of scientists, engineers, and men from government. Inanely, his mind echoed the first comment it had made on his arrival: "Look at the big-shots—pretty fast company for a small-town G.P.!" He tried again to laugh a little at himself for having been impressed, and found no laughter. He made his glance move on—on past the Doorstop—discovering with a curious sense of shock that the mineralogist had resumed his seat, and that farther down a different man, a biophysicist from Princeton, was talking now. Immediately, his mind shut out the words; immediately, it took him back a week in time, back to his first acquaintance with the Doorstop—when it had been just that and nothing more.

He saw it there again, holding the door ajar as he had seen it then—a twelve-inch dumbbell on a five-inch cone, corroded green as any Roman sword, as any sunken galleon's gun dredged from the sea. He saw the clouded crystal hemispheres at either

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end, obscured by dust which could not quite obscure two pinpoint brilliancies. Entering, he halted; put his golf clubs down. He felt the strangeness of its lines and curves. Frowning, he pushed it with his foot, finding it heavier than it ought to be. Annoyance rose in him, at Eleanor, cluttering the house with all these antiques.

"Hello?" he called to her. "Ellie, what *is* this thing?"

Her voice replied out of the kitchen, "Did you have a good game, dear? I'm glad you're back for lunch." Drying her hands, she came into the hall. "What thing? Oh, *that*. I got it just today from Mrs. Hobbs. It's . . . well, it's a doorstop." She kissed him. "You don't mind, do you, dear? I only had to pay four-fifty for it, after all."

"Ellie, that's not what I mean. I can see you're *using* it for a doorstop. I mean, what *is* it? What was it meant to be originally?"

She laughed. "Goodness, I don't know. It looks awfully old. Maybe it's something off a sailing ship—one of those things they wrapped the ropes around."

He knelt. He turned it carefully over on its side. "Could be," he said. "Gosh knows it weighs enough. But if it is, what are those two glass ends for, and these holes reaching up into it right next to them? And what's that sort of socket in its base?" Uneasily, the feeling of its strangeness grew on him. Somehow, it wasn't *right*. It didn't fit.

Shaking his head, he put the Doorstop back against the door. He rose.

"What's wrong?" she asked.

"I don't know. I just don't like the thing. It . . . it's *queer*."

"Oh, don't be superstitious." She laughed at him. "Perhaps they got it off a Chinese ship, a junk or something. What difference does it make? Anyhow, now it's just a doorstop."

Taking his arm, she led him off to lunch, where there were other matters to discuss.

After that, he had said nothing more about it. Three or four times a day, going in or out, he had paused to look at it, experiencing the same sensation of uneasiness. On each occasion, he had shrugged, telling himself that it was hers, that if she liked it that was all right with him.

Then, three evenings later, instantaneously, all this had altered. It was a hot, dull evening under a sweltering sky, and he was waiting for her in the hall. The Doorstop stood against the big front door, holding it open to welcome in any unlikely breeze. The tiny focal points of light at the exact centers of its now polished hemisphere gleamed in the curdling dusk. The sun's departure had not diminished them. They shone more brightly than they had before. They shone—

And suddenly, before his eyes, they changed.

They did not move; there was no movement visible. The inner one, the one toward the hall, had disappeared. The other, which had been pointing straight out through the door, was

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now displaced by forty-five degrees. It pointed outward still, but to the sky.

He saw. For several seconds, he did not understand. And then the first chill wave of comprehension struck at him. He had assumed those minute brilliances to be reflections of the outer light; he had ignored their immobility. They shone where light was not; they were *inside* the hemispheres. They were inside the Doorstop, and part of it, part of its armored and mysterious purposes. It was no simple artifact. Alien to him and strange, it was a mechanism, a machine.

The Doorstop stood there against the door. He stared at it. The questions sounded in his skull. What was it? What was it made to do? Where was it from? The questions and the contradictions hammered him—its thick corrosion, as though it were a thing out of past ages before machines were born; the wrongness of its planes and curving surfaces; the two infinitesimal fires shifting fast as thought. He stood there staring at the Doorstop, and felt an answer stirring in his mind, stirring like something vast and dark and cold beneath the summer surface of the sea. Instantly, angrily, he rejected it.

When Eleanor came down the stairs to join him, he told her nothing. They drove to dinner; they returned; finally they went to bed. And all the while, withdrawn into himself, he fought the obstinate irrationalities, trying to bend them to familiar shapes, seeking an answer native to his world.

He found it. It lay there ready-made, compounded for him out of the threat of war, out of repeated rumors, tensions, secrecies—the paper perils of the day and year, cocooned in headlines which could be torn and burned and thrown away. In these, he told himself, the Doorstop had had its origin. Men had conceived it. Men had employed the magic of their sciences to give it form and plan its functioning. Somewhere, in the not-yet-believable mythology of arming for destruction and defense, it had its place.

He thought of guarded factories, locked laboratories, of dangerous knowledge, spies and counter-spies. The mystery was explained; he was relieved of the necessity for explanation, for doubt, for further thought. The Doorstop was a simple thing, as understandable as friend or enemy, as easily acted on. Whatever knowledge it might yield should either be protected from all eyes or torn from it. He thought of Terry Froberg, grown up now, an electronics engineer working behind the ramparts of Security. Young Ted would know about the Doorstop; where it belonged; how to dispose of it.

He told himself all this repeatedly; each repetition was a stone to seal the chasm menacing his world, to seal away that other answer still pressing upward to his consciousness. He wrapped himself in certainty. Imagining the military importance of the Doorstop, he let himself enjoy the

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thrill of touching great affairs. He chuckled at the thought of how surprised young Ted would be. After a time, he slept.

Next morning, after breakfast, he called on Mrs. Hobbs, the antique dealer, and questioned her. Peevishly, she assured him that everything in *her* shop was come by honestly, that he was welcome to go right over and ask that Cory boy, who'd sold it to her.

He went right over; and the Cory boy, snatching a four-bit bribe, told him that he had found the Doorstop down near the railroad tracks, half-buried in the ground where there had been a sort of fire.

Afterwards, he drove into Detroit.

At the Directors' Table, Dr. Howard Cavaness recalled how the expression on Ted Froberg's face had changed at the unwrapping of the Doorstop, how he himself had been surprised at that astonishment. He recalled going home and telling Eleanor, too frequently, never to say a word to anyone. He recalled the noncommittal questioners, civilian, military, who had come to them, to Mrs. Hobbs, and to the Cory boy. And he remembered how, during those few days, the shadow of disquiet had attended him, waiting for moments when his guard was down—how it had crept upon him in his sleep, in the cold, drifting dreams where Uncle Matt was dead, and lost, and irretrievable in the immensities of time and space—

Once more, in anger, his mind repelled the thought. Once more, it framed his still-life of reality, letting him clutch the safety painted there. He felt his forearms press the hard, brown wood. He felt the quickened beating of his heart, and frowned. Words reached him, and he raised his head. He knew the voice. He recognized his name.

". . . Our gratitude to Dr. Cavaness—"

He looked up to the left, over the bell jar and the Doorstop. Ted Froberg was the speaker now. Tall, seriously intense, he stood behind his chair.

". . . Who, even though his background isn't technical, recognized the importance of the instrument. I guess I don't need to tell you what a lucky thing *that* was." He paused. He grinned at Dr. Cavaness. "That's about all," he said. "If there are any questions, I'll try to answer them."

Then, gathering his courage in his hands, Dr. Cavaness spoke. "Well, how about it, Ted?" he asked. "Now that you've got it figured out, what *is* that gadget? What country is it from?"

He waited. Only the fall of silence answered him. He saw young Froberg's grin erase itself. He felt the quick, astounded glances gossiping.

"You mean I get three guesses?" He laughed aloud.

And no one echoed him.

There was a whispering round the table; its volume grew; three or four men started to speak at once. Raising his hand, young Froberg quieted

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them. "Wait," he said softly, soberly. "I've known Dr. Cavaness all my life. I think I understand."

He sat down on the table's edge, leaned over towards Dr. Cavaness. "Look, Dr. Howie, let me go over this again. I'll outline it. We don't know what this object is, or what it's for, or even what it's made of—at least, not accurately. They'll probably learn more back East, with their facilities. However, we've found out what it *does*. Believe me, that's enough to hold us for a while."

He was explaining slowly, patiently; and Dr. Cavaness endured the invading words, trying to listen to them separately, to isolate them from their sentences, to quench their meaning before it reached his mind.

Ted Froberg pointed at the Doorstop; he no longer seemed so very young. "When you first brought it to us, we looked it over pretty carefully. We found those two holes in the dumbbell ends—remember them? Well, they're T-shaped. Inside, at each end of the cross, there is a knob. They're cupped and knurled, like push buttons. But they weren't made for fingers, Dr. Howie. Fingers can't get at them. They're for—something else."

Dr. Cavaness forbade the thought to form. Against it, he braced the trembling walls that held his world to its perspectives and accustomed measurements. He wiped the perspiration from his palms.

"We pushed the buttons; nothing happened," Froberg said. "We rigged a business to push all four at once—and the whole thing opened up, and there was all this *stuff*. It was beyond us; it made no sense at all. We didn't dare to disassemble anything for fear of wrecking it. We took some specimens, as small as possible. We tried to run analyses, and some of them succeeded. They were unbelievable; we couldn't even guess at physical conditions where manufacturing such materials would be possible."

Dr. Cavaness saw the excitement in his eyes, and shrank from it.

"Our next step followed logically. Those points of light had shifted by themselves. Besides, the socket in the base seemed to contain contact elements. We carried through a series of experiments. We found out that the points of light respond at least to radar frequencies; when you were watching them, they must've picked up a reflection from a plane, and followed it. We also found that, when this happens, the hemispheres set up a weird sort of field that propagates at half a light-velocity—and that there's something else inside that reacts to gravitational and magnetic gradients. Each of these functions modifies the others, and at the output end they're translated into the damnedest wave-forms we've seen yet. The oldest part of all is that there simply is *no* source of power."

Dr. Cavaness listened—and in the final fastness of his heart he prayed. Voicelessly, in a despairing language without words, he prayed to a parochial God to make this all untrue, to

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wipe it out, to let his world remain as it had been. *Oh God, preserve these small peripheries against all things incomprehensible; I am my world; its limits limit me; allow the stretches of eternity, the darknesses, to stay unreal; oh God, deny this living proof that life unthinkable teems in those depths and distance, that they exist—*

"Look, Dr. Howie," Froberg cried, "we don't know what they *use* it for—perhaps in navigation, or to direct a weapon of some sort. But we're certain of one thing—and that may be a little hard to take. It wasn't made in any country here; it wasn't even made on Mars or Jupiter. *It's from the stars.*"

Here was the answer, stated and defined. Here was the looming nightmare made real. Here was the naked Universe. Dr. Cavaness saw it. He held it still at bay. For moments out of time, time ceased. His mind turned inward, clawing the substance of his dissolving world, trying to fabricate one last escape. He thought of the corrosion which had encased the Doorstop. He thought of Chinese bronzes, ancient urns, green with their many-centuried burial in the earth. The past had vanished; there was safety in the past—

"Well, anyhow," said Dr. Cavaness, "I guess it's been a long, long time since *they* were here—two or three thousand years. It takes that long to get a chunk of bronze all rusted up like that. At least that long. Ted, doesn't it?"

Ted Froberg looked at him. "It isn't bronze," he said. "That's why we have it in that bell jar there, pumped full of helium, sealed. Maybe corrosion would take all that time, back in *their* atmosphere. But not in ours. *In ours, it took three weeks.*"

And Dr. Cavaness sat silently; he stared straight ahead—facing the majesty of God, facing a new maturity for man, facing the open door.

THE END

IN TIMES TO COME

The lead story next issue is "False Prophet," by our two-headed author, Robert Randall. (One of his two heads won the year's Science Fiction Convention Award as the Most Promising New Author of the year; his other head is too old to be eligible.) It's another of the Bel Rogas yarns—concerning a Nidorian who was roundly cheated by the Earthmen, which saved his life, but not with his consent . . .

Also, by the way, Isaac Asimov, science-fictioneer, has the concluding installment of "The Naked Sun," while Isaac Asimov, Professor of Biochemistry, has an article "Names! Names! Names!" In a somewhat different way, Asimov's another of our two-headed authors! THE EDITOR.

P.S. Anyone doubting the statement that we have a two-headed science-fiction author can be given documentary proof of the statement.

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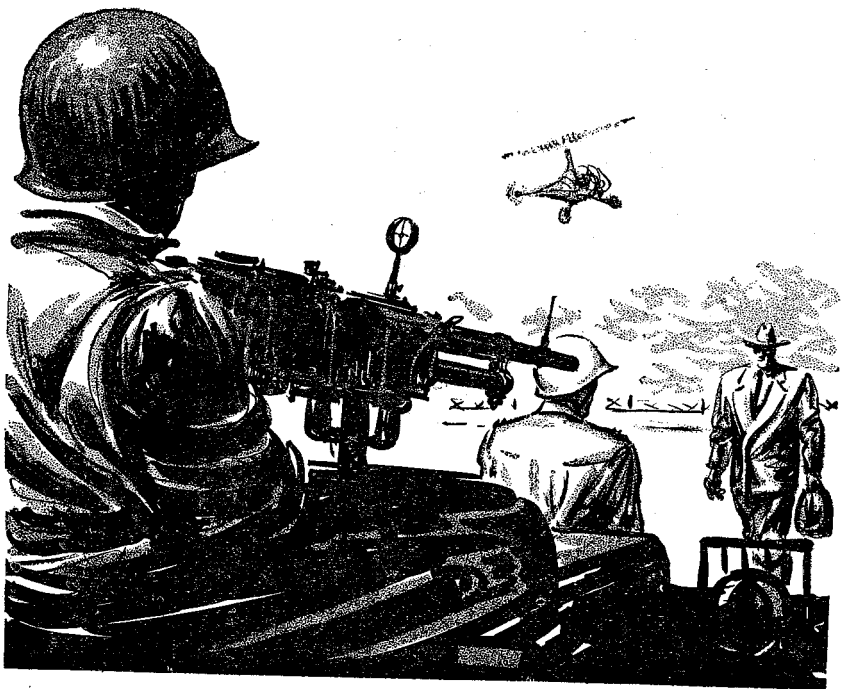
WITH ALL THE TRAPPINGS

BY RANDALL GARRETT

There is one specific type of secret that no espionage force can ever penetrate—and, because of that fact, can never cease from seeking to penetrate!

Illustrated by Freas



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When I first saw Eden Valley, Colorado, I was tremendously impressed by the neatness of the place. I saw it at a distance from the helicopter, and it looked like a little toy town, all scrubbed and shining in the summer sun. Then, as the ship dropped, a low mountain cut off my view.

As the pilot eased the ship down, he said: "There'll be a car waiting to pick you up, sir, as soon as the airfield clearance goes through."

"Fine," I said. I didn't particularly care to drive five miles over a winding mountain road, but the air above Eden Valley was posted. Perhaps "posted" doesn't convey the idea strongly enough; I'll put it another way. Any aircraft that came inside the five-mile limit was shot down as soon as it was spotted, without even asking for identification. That, of course, only applied to helicopters. Faster aircraft were fired at long before they got that close.

The helicopter jounced a little as the landing gear touched, and the pilot cut the ignition. "Here they come, sir."

Two armored cars pulled up, and I noticed the machine guns in the top turrets were trained directly on us. It's queer how a fifty caliber hole can look three inches in diameter when you know what's at the other end of it.

Two Army captains climbed out of one of the cars.

"Mr. Derek Martin?" asked one of them. I noticed that he kept his hand on his pistol butt.

"I'm Martin," I said.

"Your identification, please, sir."

I took out my ID folder and handed it to him. The other officer held up a print plate, and I rolled my right thumb over it. The two captains compared the print with the ones on my ID papers.

"All right, sir," said the first one, "get down and get in the back of the car, please."

The back of the armored car was a steel box just big enough for maybe four people to sit in, completely separated from the rest of the vehicle. Two barred doors were swung shut and locked behind me, and the second armored car drove up behind the one I was in. The machine gun was still trained on me. All I had to do was try to get out, and a hail of steel-jacketed lead would come at me through the bars. I began to wonder if I liked this assignment after all. It carried a big bonus, but money isn't everything.

The escort left the airfield and roared out over the smoothly paved, winding road that led toward the most cautiously guarded research area in America—Eden Valley.

After several minutes, the cars slowed to a halt, and one of the captains came back to unlock the doors. I got out, and the two officers escorted me to the first gate. There was a large gatehouse there, and two riflemen stood nearby, their weapons at the ready. We

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went inside, and the major in charge put through a direct vision-call to Washington. I was identified personally by the Chief, and the major seemed to be about halfway satisfied.

"All right," he said to one of the guards, "let him through." He turned back to me. "You'll have to cross No Man's Land by yourself. The Outer Guard isn't allowed inside the compound."

No Man's Land was a space about a hundred yards wide between the Outer Wall and the Inner Wall. It was completely bare of rocks or vegetation and offered no cover whatsoever. Between the Outer and Inner Gates ran a stretch of paved walk six feet wide.

"Don't step off the walk, sir," said the guard politely as he opened the gate. He said it in the same way that an explosives expert might say: "Don't drop the nitroglycerine." It wasn't a threat; it was simply an implied statement of consequences.

I walked the hundred yards quietly enough, but by the time I got to the other end of the walk, I had developed a subcutaneous itch in the middle of my back and another one just below my sternum. Steadily aimed gun muzzles have a peculiar effect on the human mind.

The Inner Gate swung open, and another officer led me to the second gatehouse. This time, they checked my identity with Hamilton.

It was nice to see the smiling face of a friend instead of the calculating looks of armed men. Hamilton's heavy face looked like an oasis in a desert of scowls.

"Hello, Derek," he said. "How's your sister?"

"The same as yours," I said, grinning. Neither of us had a sister.

"Have you seen Eaglepuss lately?"

"Not since Fifty-seven."

Eaglepuss was what we had called one of the slickest counterfeiters that ever engraved a plate. He'd been shot to death in 1957.

"I guess you can come in if you're a good boy," Hamilton said. His eyes moved to the officer. "Tell him how to get to my office, major."

Getting to Hamilton's office was tiresome and tedious. Tiresome because I had to show my ID folder about every block, and tedious because Hamilton's office was nearly a mile away.

There were no automobiles allowed in Eden Valley in those days; it was too risky. A car is too much of a weapon to allow it in a restricted area. Eden Valley wasn't as big then, either, though the pattern and structure of the town hasn't changed much. There were rows of neat little houses surrounded by low shrubbery and green lawns, and wide, smooth, utterly useless streets.

Outside the Research Area was another gate in a high storm fence. The guard checked me against the main gate and against Hamilton. By the time I got to Hamilton's office, I was ready to throw knives

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at somebody—I wasn't quite sure just who, but somebody.

"What kind of a set-up is this?" I asked as soon as I walked in. "What are you building here? A gadget to turn the Russkis into pink caterpillars?"

Hamilton had already poured a couple of bourbon-and-waters. He leaned back in his chair, handed me one, and grinned. Somehow, the grin never made it to his eyes; they remained as cold and hard as a glacier.

"Sit down, Derek," he said, "and let me tell you Rule Number One around here. Rule Number One is: We do not talk about, ask questions about, get nosey about, or even admit the existence of anything going on around here. This is just a normal little American town populated by normal American scientists, normal American security agents, and nobody else. Real normal. There is nothing going on here, at all, understand?"

"I understand," I said. "I'm no scientist, anyway; I probably wouldn't get it if someone drew me a picture of it."

"A lot of people wouldn't understand it," said Hamilton. "But I want you to understand this, and understand it well." He leaned across his desk, and his grin was gone. "We're not at war yet. Maybe we never will be. But if our enemies ever find out what's going on here, we will lose one of the most potent weapons against them we've ever had. It's your job to protect that secret."

"All right," I said, "how do I do that?"

Hamilton relaxed again, his imperative mood gone. "It isn't easy. Despite the precautions, we still find men coming in who are not, shall we say, exactly in sympathy with the government of the United States. Your job will be to keep your eyes open—nothing more. Any little thing that strikes you as being off color is reported and investigated—thoroughly. You remember how hard it was to get in here?"

I think I winced then. "I know," I said.

Hamilton nodded slowly. "Well, believe you me, it is harder to get out. You're in prison here, Derek; a prison that makes Alcatraz look like a boy's summer camp as far as being escape-proof is concerned."

I started to ask him what could be so important that it had to be guarded this way, but I remembered Rule Number One, so I said: "I'm supposed to watch for stuff that shouldn't be going on. A nice, routine job. With a set-up like this, I suppose you've got every house in town wired to the gills."

Hamilton shook his big head. "Not a bit of it, Derek. Oh, we've got TV pickups and microphones planted here and there just to keep everybody on his toes, but there's no need to overdo it."

I nodded. I could see the logic in that. No enemy agent with half an ounce of brain would discuss

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anything in a house, anyway. He'd automatically assume that the place was wired. He wouldn't dare go looking the place over for mikes and stuff, because that alone would be suspicious. He wouldn't even dare do it in the dark or with instruments, because the pickups might be rigged with infrared or UV. Therefore, why wire the houses? No smart agent would do anything worth watching, and the stupid ones could be caught in other ways. Even if a smart agent suspected that the houses weren't wired, he wouldn't dare act on the assumption.

Hamilton said: "I may as well start showing you around now. You'll be second in command here; you'll take orders from no one but me."

I was a little surprised at that, and I admitted it.

"Why drag in an outsider? Don't you have men here who already know the ropes?"

"You were picked," said Hamilton brusquely. "Let it go at that."

He walked over to a wall cabinet and unlocked it. "You'll need a gun."

I certainly would. I'd been told that I couldn't bring my own weapon in with me, so I'd left it in my office in Washington.

Hamilton handed me a .357 Smith & Wesson Magnum revolver and a box of Magnum cartridges.

"Carry this fully loaded at all times. If anyone does anything out of the ordinary, shoot first—"

"Do I leave him in condition to answer questions later?"

"You do," said Hamilton. "Unless, of course, your own life is in danger or there is danger of someone getting away. Otherwise, don't shoot to kill; just knock them over."

"Fair enough." I holstered the weapon in my right hip pocket holster and jiggled it a little to make sure it would come out fast, just in case I ever needed it.

"Let's go," said Hamilton.

"Except for the gates," Hamilton said, "we are in charge of the inside of Eden Valley. The Army takes care of the outside."

We were standing on what Hamilton laughingly called Lookout Point. It was a rock prominence about twenty feet high situated roughly in the middle of Eden Valley. A small shack had been erected on the top of it, and from it a man could survey the entire valley. There was an alarm phone which could call any point in the valley within seconds in case of an emergency.

Hamilton pointed at the walls. "The Outer and Inner Walls are twenty feet high, and made of electrified steel storm fencing—special grade. The No Man's Land between them is mined, and the mines will explode on contact or they can be set off from the guardhouse if necessary."

"All mined except for the path between the gates," I said. I could

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still remember feeling those machine-gunn muzzles as I walked that hundred yards.

"The paths are mined, too," Hamilton said. "But they take about five hundred pounds of pressure. They'll stop a car, but a man is perfectly safe. Unless they push the button in the guardhouse."

Suddenly, my feet itched, too.

"Over there," said Hamilton, pointing with a thick finger, "is Research Area, where we just came from. It's divided into sections, and no man working in any section is permitted to discuss his business with a man from another section unless the development of the Project calls for it."

I simply bobbed my head up and down to show that I understood.

"And there"—Hamilton shifted his finger—"is the Mountain. Geologically, it's supposed to be the solidest rock in the Rocky Mountains. I hope we never have to test the geologists' theory."

Against one side of the Valley loomed a great hunk of granite, a wall of stone that went up and up to a peak an eighth of a mile above the valley floor. In its sides, burrowing deep within it, were the tunnels and rooms where the most important part of the project was contained. Not even an H-bomb could do too much damage to that monstrous slab of living rock.

"Now that you've seen the general layout of the land," Hamilton said, "we can get a little more specific. We'll take a stroll around and look over the various sections. Come along."

The Research Area was cut up into several areas by high storm-fencing and the gates were heavily guarded. I was personally introduced to each guard. There were no special passes which would allow a man to circulate freely from one section to another; something like that could be forged. The only thing to do was make sure that every guard knew who I was and what my function was.

The nuclear physics section wasn't nearly as large as I had expected it to be. There seemed to be all sorts of equipment around, and one big building obviously held a reactor of some sort, but nothing was explained to me. There were signs here and there: "CLASS A PERSONNEL ONLY," "CLASS B AND ABOVE ONLY," "SECTION THREE ONLY"—things like that. Everyone wore colored badges with numbers and letters on them which indicated what their business was and where they could go. Anyone who was found outside his own sphere of action was immediately suspect.

The chemistry section was divided into hot labs and cold labs, depending on whether the material handled was radioactive or not. Again, nothing much was explained to me, although Hamilton pointed out a few things.

I distinctly remember wondering why anyone would want six gallons

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of radioactive ethyl alcohol. When I asked Hamilton, he shrugged. "How should I know?"

The pure mathematics section was the quietest of all. There were about a dozen men in a dozen offices and a big library. In one room was a series of feed-in boards for some big electronic calculators, but nobody was using them at the time. Most of the men seemed to be content with pencil and paper, and about half of them were leaning back in their chairs with their eyes closed—just thinking.

The head of the section was a tall, blond man with a spare frame and an easy smile that spilled over into his blue eyes. Hamilton introduced him as Dr. Edmond Gerton.

On his desk were ten or fifteen sheets of ordinary typing paper covered with esoteric inked symbols.

"We're working on a lot of things here," he explained. "Homology group theory, games theory, transfinite algebras, all sorts of things."

"Nobody seems to need those calculators," I said.

He grinned. "That was the government's idea, not ours. They thought that mathematicians needed them, so they were handed to us without our asking. We use them once in a while—just to play games with. But most theoretical math is pure pencil work."

"When we get over to Statistics, you'll see plenty of them in use," Hamilton put in.

"Oh, by the way, Ham," the mathematician said, "let me show you something."

He walked over to a low, broad desk that ran along one wall, and knelt down to an electronic control panel. He fiddled with knobs for a minute, and a loud-speaker in one corner began making a chirping noise. Irregular peeps of sound twittered in the air.

"Eight thousand cycles," Gerton said. "Now listen."

He turned another series of knobs and the chirping dropped in tone until they became a series of grunts.

"Twenty cycles."

"What's your signal?" Hamilton asked.

Gerton was positively beaming. He lifted up a section of the top of the desk and disclosed a turntable spinning a record around. "It's Des Pres' *De Profundis*. How do you like that for a selective filtering system?" He turned knobs again, and slowly the strains of Fifteenth Century music appeared. "Any bandwidth I want," said Gerton.

Hamilton shook his head in mock disapproval. "Sometimes, you hi-fi nuts go too far. The next step is a filter that takes out everything."

Gerton turned another knob, and the music stopped abruptly. "Got that, too. It's called an 'off switch.' It corresponds to the 'on' switch except for the orientation of rotation."

Hamilton turned to me. "Derek, stay away from mathematicians with a low sense of humor. They're bad

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enough when they're trying to be serious."

"If you're going over to Statistics," said the mathematician, "I'll walk along. I've got to pick up some figures and graphs."

Hamilton was right. Statistics had more computers than Math had, and everyone of them was working at top speed, absorbing and chewing over figures and spitting them out at a fantastic rate. What the figures meant, I didn't know, and I suspect some of the technicians didn't, either. No one was allowed to know more than he absolutely had to know in order to do his job.

Dr. Gerton vanished into the office of the head of the Statistics section, and Hamilton led me on to the next compound.

Psionics section was about the screwiest set-up imaginable. It was divided into subsections which worked on telepathy, psychokinesis, precognition, sympathetic magic, teleportation, and half a dozen other related phenomena. Some of the weirdest gadgetry imaginable was being seriously investigated, in spite of the fact that not one of them could logically work.

"This is the Department of Impossible Possibilities," said Hamilton.

There were more sections. There were high and low temperature

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physics and chemistry labs, high and low pressure labs, radiation labs, biology labs—name it; Eden Valley had it.

We wound up back in Hamilton's office with a dizzying amount of information in my head in spite of the fact that I hadn't really learned anything concrete. I would have given my left arm to know what was going on, just for my own information.

The one place that Hamilton hadn't taken me was the big cavern under The Mountain. What went on under there was too secret even for my eyes. We did manage to get into one of the tunnels, but it was only a part of the big maze, and there were several doors, painted red and equipped with locks, which were guarded by armed riflemen. Only if a man had a key could he get into one of those places.

All the information and a great deal of equipment from every section was swallowed up in that cavern, but what happened inside there was anybody's guess.

"Now you've got the background," Hamilton said. "Your job will be a sort of patroling watchman's job. You keep, as the saying goes, your eyes open and your mouth shut."

That was Hamilton—full of old maxims.

"Don't use that gun unless absolutely necessary," he went on. "If someone is obviously trying to get out of here or trying to sabotage something, drill him. But if he's merely a suspicious character, just let me know, and we'll keep an eye on him."

Frankly, I didn't quite see what good that would do. Nobody was going to do anything suspicious as long as I was around; I wouldn't catch any but the stupidest.

There's one other way, of course: the cumulative method. Take a really clever agent. No one thing he does is suspicious in itself. But, over a period of time, the effect can accumulate, and, suddenly, for no reason at all, you begin to suspect the guy. Just exactly when that point is reached depends on the intelligence of the spy and the intelligence of the observer.

I hoped I was bright enough to spot any spies—if there were any.

"All right," I said, "I'll prowl forth. How do I make my reports?"

"Orally," said Hamilton. "Direct to me. I want you out there watching, not writing reports up. Go to it."

So I went out into the crisp Colorado air.

It took time to get the feel of the place. That's the only way you can use the cumulative method, though. You've got to know what's normal before you can detect the abnormal. It was over a month before I felt sure that I knew Eden Valley well.

During that time, I went everywhere, which was something no other man except Hamilton could do. It was definitely not my job to

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speculate on what was going on in Eden Valley. I was supposed to be looking for enemy agents, not doing their job for them. But, Government Secret or no, a man can't help wondering.

Anything that was so ingeniously concealed, even from the security-cleared personnel who were actually working on it, must be something really big.

My first guess was spacecraft, but I discarded it pretty quickly and didn't get back to it until later. After all, with a satellite flying across the sky every night, in plain sight of everybody, why should space travel be so secret?

So I let my imagination run wild. I'd said something to Hamilton about a gadget to turn the Russkis into pink caterpillars. Could that be close? After all, we *did* have a psionics section, and neither I nor anyone else knew what the limitations of *that* were. Still, it didn't sound very probable.

Time machine, maybe? Hadn't someone once said that a positron could be shown to be the mathematical equivalent of an electron traveling backwards in time? Maybe that's what the Math Section was working on.

Death ray? Could be, but somehow they didn't seem very practical.

It wasn't until close to the end of the month that it occurred to me that someone might have invented a space drive other than the conventional rocket. What if someone had actually invented an ion drive or a space warp or maybe some teleportation device? It sounded more possible than anything else, and the more I thought about it, the more convinced I became, until I finally decided it was spaceships or nothing.

I was right, of course, in a way, but I didn't know how until later.

I didn't let any of my guesses get in my way—at least I don't think I did. I paid strict attention to business. I became friendly with everyone, at least, as friendly as it was possible to get in a place like Eden Valley. Actually, any conversation had a tendency to be stiff. What could you talk about? Your work? Not on your life! There were too many counterespionage agents around for that, and everyone knew it. And, even aside from the C-E men, there were plenty of technicians and scientists who would report any illegal talk. It was even suspicious-looking for a couple of men to talk in low tones together.

That eliminated any personal discussions, because it was necessary to speak well above a whisper.

Mostly, the talk ran to sports or politics or literature. They were mostly innocuous subjects. What do you think of the Dodgers' chances this year? Will the Senate pass that new tax bill? Have you read Asimov's latest detective novel? For five solid weeks I listened to stuff like that and kept my eyes open.

I'm not sure exactly when it was

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that I began to suspect Dr. Edmond Gerton. That's the trouble with the cumulative method. Little things build up, but there's really nothing you can put your finger on, and you can never be quite sure exactly at what point you become suspicious. But I slowly became convinced that there was something vaguely *wrong* about Dr. Gerton.

I found myself watching him, wondering just what it was that was wrong; I couldn't quite spot it, but I knew it was there. There wasn't even any evidence to take to Hamilton, so I didn't bother my superior until I had enough evidence to make a case.

He was a chess player, and a good one. I'd noticed that at the Recreation Center. So, one evening, I asked him for a game.

"Sure," he said, his blue eyes lighting up.

I watched him as he set up the men at one of the tables in the big Rec Room, trying not to look as though I were watching him.

As I've said, he was tall and blond. His wide shoulders were draped with a tweed coat that had seen better days and which sported large leather patches at the elbows. His trousers tended to be a bit baggy, and his white shirt was open at the throat. Except for the fact that he smoked cigarettes instead of a pipe, he might be taken for the very model of a modern college professor—the kind who loved his work and didn't give two whistles in a rain barrel what the Well Dressed Man should wear to tea.

There was certainly nothing directly suspicious in that.

"Go ahead, Derek; your move."

"Giving me white, Dr. Gerton?"

"If you'd rather play black—"

"No, no," I said. "I'll keep white." I moved my king's pawn to KP-4. He moved his king's pawn up to block me.

As I moved my queen's pawn up to QP-3 to protect, he said: "By the way, Derek, call me 'Ed,' will you? I've always felt that 'Doctor' should be reserved for M.D.'s."

"Sure, Ed." He had brought out his queen's pawn, so I put out my king's knight. He countered by bringing out his queen's knight.

As the game developed, I noticed that his tactics were cautious, but never cowardly. He spent a great deal of time thinking the situation over, but when he moved, it was with decision and without regret. He made sure of his ground and then went forward. He moved with mathematical military precision.

Eventually, I saw a chink in his defense. I studied it carefully. He was obviously laying a trap for me at an area near my queen's knight's file, but I could see that the real trap lay closer, on my king's bishop's file. But did he see the chink? I thought not, but I wasn't sure.

Take a chance. I took a bishop with a knight.

"Check!" said Gerton.

I blocked with my bishop, lost it, and blocked with my remaining

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knight. In quick succession, I lost the knight, my other bishop, a rook, and my queen.

"Mate!" said Gerton.

And it was.

He leaned back in his chair lazily. "Very good! I don't think I've had quite such a game."

I lit myself a cigarette. "That was a good trap, Ed. A really beautiful job."

"Thanks, but I don't deserve the compliment. You didn't fall for either of the other traps; you took the tough one."

"There was no other way out. You'd have had me in three moves, otherwise," I explained.

"Would I really?" he looked genuinely surprised.

"Sure," I said. "Look."

I set them up again. Then I did a post-mortem on the game.

"I'll be damned," Gerton said. "I honestly hadn't seen that; I was too busy setting up my own defense."

"You did a good job," I said. "I learned a lot."

There was absolutely nothing concrete I could pin on Gerton, but I still had the feeling that he was a bad risk. I played several more games of chess with him, trying to feel him out, and my suspicions increased more and more. He had a way of playing that was different, to say the least. If he was playing defensive, he set beautifully elaborate traps, almost totally ignoring his offensive possibilities. Almost, but not completely. He never really lost sight of trying to win the game; he simply didn't pay any attention to what might have been the quickest and easiest way. It was as though he let his conscious mind direct the part he was interested in and let his subconscious take care of the rest. His offensive game worked the same way.

As chief of the Math Section, he was allowed considerable freedom in the project—not as much as Hamilton and I had, but more than any other Section Chief. Gerton could go to Statistics, Cybernetics, and Communications Sections any time he wanted, while other Section Chiefs were allowed to go to no more than one other section. If Gerton were a spy, he certainly had plenty of opportunity to get information.

But the first time I got any concrete information was the day that I was walking through the Organic Chemistry Section and a chemist by the name of Brettmuller walked up to me and whispered: "Mr. Martin, I'd like to see Mr. Hamilton." Then, louder: "Could I mooch a cigarette, Mr. Martin?"

"Sure." I fished a cigarette out of the pack in my pocket and whispered. "What is it? You can tell me."

"No! I don't want anyone to know. I've got to see Mr. Hamilton."

He thanked me for the cigarette, and as I lit it, I whispered: "See

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me at the office during the lunch hour."

Then I went directly to Hamilton and told him about the incident.

His bushy eyebrows drew down over his eyes. "Brettmuller? Hm-m-m." He went over to the files and looked at the chemist's card. Then he said: "I wonder what he wants. How did he sound?"

"He sounded as though he'd spotted something and didn't want anyone to know. Probably saw one of the other men in his lab do something fishy and wants to report it."

Hamilton nodded. "O.K. I'll tell the guard to let him in. There may be something to it. Meanwhile, have you found out anything?"

I debated then on whether or not to tell him of my suspicions of Gerton. I wish I had; it would have saved a lot of grief later. Instead, I said: "Nothing I can put my finger on."

Hamilton jerked his finger toward the door. "O.K., then go out and find something."

I walked over to the cafeteria for coffee, wondering just what it was that Hamilton thought I should find. In some ways, Hamilton acted as though counterespionage was something like geology. A geologist says to a mining engineer: "Formations like this are normally oil-bearing. Go find oil."

Hamilton, in essence, was saying: "Projects like this are normally spy-bearing. Go find me a spy."

I drank coffee in the cafeteria and wandered around a little more, trying to put things together. It had already occurred to me that part of the project was a blind. There were more sections than actually necessary, put in there to confuse the enemy. The enemy probably knew that, too, but until they knew which ones were blinds, they had to investigate every individual section of the project.

At a little after twelve noon, I went back to Hamilton's office. I decided that if the chemist, Brettmuller, had anything to say I ought to know it.

I got there too late. Brettmuller was walking out of the office as I approached. He stopped at the guard post and said something. I was about fifty yards away at the time, and I don't think Brettmuller had seen me yet.

Suddenly, everything seemed to happen at once. There was a thunderous blast, and smoke billowed out of the shattered window of Hamilton's office. At the same time, Brettmuller's fist smashed against the guard's temple. As the guard fell, Brettmuller grabbed his rifle.

I already had my .357 out, but, like the guard, I had been taken by surprise, and was a little slow in my reflexes. The gun kicked in my hand, but the shot went wild. Brettmuller lifted the rifle in his hands and took aim. He'd seen me.

There was only one thing to do, so I did it. I fired more carefully

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the second time. The blast of the Magnum drowned out the sharp *crack!* of the military rifle.

The bullet from the rifle ripped past my ear with an odd sound like a sheet of canvas splitting.

Brettmuller tried to aim the rifle for a second shot, but he was already crumpling when I fired again.

By that time, the guard had lifted himself to a sitting position, and there were people coming from everywhere.

Fortunately, the Emergency Squad could take care of it. Every security agent who was off duty was a member of the Emergency Squad, and it wasn't long before the place was quiet again. None of the other agents moved from their posts, which was good. Their orders were to hold their posts, no matter what happened.

Brettmuller was dead. I ordered two men to take him to the Infirmary, and went into Hamilton's office.

The office was a shattered ruin. The windows were gone, the plaster was cracked off the walls, and the room was filled with a drifting bluish haze which burned my eyes and throat.

It took me several seconds to recognize the figure huddled brokenly in one corner, and several more to realize that I would never talk to big, hardheaded, good-natured George Hamilton again.

I put in a call to Washington and gave them the picture.

"Take command," I was told. "We'll have General Cordley out there in less than two hours."

I went back to Hamilton's office to see what I could salvage. The Medics had taken Hamilton away after I'd taken all his personal effects. They were lying forlornly on the littered desk, all by themselves in a spot I'd brushed clear of debris. I picked them up, one at a time: Key ring; a silver dollar; loose change; four crumpled dollar bills; a mashed cigar; a small lighter; a broken fountain pen; and his billfold and ID folder.

I looked at the last one. Hamilton's face glowered out of a typical ID photo. I thought briefly of Brettmuller and wondered if he had had any friends.

The big steel file cabinet was dented a little, but it wasn't badly harmed. I used the key to open it and leafed through the cards. They hadn't been harmed at all.

Fromann, who was now acting as second in charge, stuck his head in the door. "We've rounded up a few queer-acting characters, Derek. This must have been done to create a diversion; I think they expected some of the guards to leave their posts when the bomb went off."

"Lock 'em up," I said. "Have you checked with Harry? How did Brettmuller get that bomb in here?" Harry was the guard at the Security Compound gate who had been slugged by Brettmuller.

"Harry doesn't know," Fromann said, "but we took a look at Brett-

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muller, and that gave us the answer. His right heel was hollow—did you notice those thick-soled shoes he was wearing? He evidently shoved the thing under Hamilton's desk. Funny how a little thing like that could have done so much damage."

"Yeah," I agreed. "We'll have to do some tightening up around here. Take those men you picked up and ask 'em every question you can think of. Make sure the Army doesn't let anyone out—not anyone."

"Right." He closed the door and was gone.

Then I noticed something in the shattered plaster just over the file cabinet. I pulled some more plaster away.

A microphone. There were wires running from Hamilton's office to somewhere else on the compound grounds! A secret microphone would have to be untappable, obviously. And there would be only one way to do that.

I walked over to the window and studied the crisscross of storm fencing that divided Eden Valley into its various sections. Those fences were carefully watched at all times, and were well lighted at night. Where would I put a wire that I didn't want tapped? Sure.

I followed the fence with my eyes. It led directly to the Math Section. I debated with myself for just a few seconds on whether or not I should wait for General Cordley to arrive before putting the bite on Gerton. I decided not to; I wanted to get to the bottom of this thing, and I wasn't too sure I'd get a chance after the general took over. I was pretty sure my reasoning was correct, but I'd have to wait for confirmation before I could be absolutely positive.

I gave orders that no one was to enter Hamilton's office, and headed for the Math Section.

Gerton wasn't in his office when I arrived. I walked through the corridor, and one or two of the mathematicians raised his head to look at me—rather apprehensively, I thought—and then went back to work. Dr. Gerton's door was the only one that was opaque; the others worked in glass cubicles. I rapped on the door, and when no one answered, I twisted the knob and went in.

I went directly to the hi-fi apparatus along one wall and started opening panels. Just as I'd expected, there was a lot more there than just a souped-up phonograph. As far as I could tell from a superficial investigation, Dr. Edmond Gerton was connected by some sort of communication line with every project section in Eden Valley!

There were at least ten tape recorders humming quietly in that big chassis, and several other types of apparatus that I didn't immediately recognize. There were transistors galore, vacuum tubes, and a host of printed circuits. The thing looked as though it had been designed to

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get as much equipment into as small a space as possible.

There was a faint noise behind me, and a voice said: "Get your hands in the air and turn around slowly."

I did as I was told and turned to look down the black muzzle of a .357 Magnum held in the rock-steady hand of Dr. Edmond Gerton.

"Oh," he said softly, "it's you." His smile was gone, and without it he looked like another person entirely. His mouth was compressed, and his pale blond eyebrows shadowed the blue of his eyes.

"Yeah, Ed, it's me," I said, trying to keep my voice level. When someone is pointing a gun at you, it's sometimes a little difficult to talk.

"So now you know. Did you figure it all out by yourself?"

"I had to. Hamilton died before he could say anything."

He just stood there, looking a little dazed. "I should have seen it. I should have known. It was all

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there, but I wasn't looking for anything like that."

"Ed," I said gently, "Ed, you're still pointing that gun at me. Mind laying it down?"

"Oh." He looked at the revolver in his hand and then put it down on the desk. I left it there.

Suddenly, Gerton looked up sharply and grabbed for the gun again. "You say you know. *What* do you know?"

"I know that you're the head man around here. You're the boss. You gave orders to Hamilton. You're the fellow who runs Eden Valley."

He lowered the gun again. "I thought you might have taken me for a spy."

"No spy could have planted a thing like this in here without Hamilton's knowledge. And this communications system would have to be built right into the works when the place was constructed. No spy could have sneaked in anything like that.

"I found the communication setup in Hamilton's office and figured that the fences must carry the lines. It's a neat way to hide lines and keep them from being tapped. No one dares to go near them, and they'd never think of the real reason the fences were there."

He nodded, and then said: "Do you want a drink? I think I need one."

"Later," I told him. "Not now."

He took a bottle of whiskey from a cabinet and poured himself a big shot in the bottom of a water glass. He drank it down and replaced the bottle.

"I slipped up," he said. "I didn't think of it."

"Hamilton must have known what the project is doing," I said. "If I'm going to know how to take care of this project in his place, I've got to know, too. General Cordley will be here in an hour and a half, and I want to be able to have this whole place in shape—if possible.

"Ed . . . what are we doing here at Eden Valley? Just what sort of project is it?"

"Essentially, the project can be represented as a multidimensional pseudo-manifold whose cohomology modules, taken as a direct sum over the dimensions, induce a canonical multi-homomorphic function whose integral over certain chains is zero," said Ed Gerton.

I blinked. *"What?"*

He looked up from staring at the top of his desk, and a little of the old smile returned. "Sorry, Derek. I guess Ham's death has upset me a little. But, believe it or not, that's just what Eden Valley Project is—or almost so."

"I believe you," I said, "but just what is a multi-whatcydoodle?"

He sat down, and the light began to come back into his eyes. "How much math have you had, Derek?"

"Integral calculus," I said.

"No algebraic topology?"

I shook my head. I didn't even know what he meant.

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"I'll try to explain it physically. Imagine two chemists. One synthesizes water by burning hydrogen in an atmosphere of oxygen; the other takes the water and analyzes it by electrolysis, breaking it down into hydrogen and oxygen, which he sends back to the first chemist. Do you follow me?"

"Sure," I said. "One guy does something, and the other guy undoes it."

Gerton grinned and gestured a little with one finger. "Not quite. They are both *doing something useful—something constructive.* You can't say which one is undoing the other's work. Look—I'll show you."

He pulled out his fountain pen and a piece of typing paper. He put two circles on it about two inches apart and labeled them "A" and "B." Then he drew two arrows; one from "A" to "B" and the other in the opposite direction.

"These are vector arrows," he said. "If one is positive, the other can be called negative, but deciding which is which is purely arbitrary. The point is that since, in this case, they are numerically equal, they cancel each other out."

"I see," I said. "If one company melts up scrap steel to make bars of forging stock and the other company forges stock into pieces which are shipped back to the first company as scrap, they cancel each other out."

"Exactly! Precisely!" It was the old Ed Gerton again. Getting him interested in his specialty had made him relax. I didn't quite see what he was driving at yet, but I wanted to keep him talking.

"So how does this apply to Eden Valley?" I asked.

"All right. By the application of algebraic topology, a network can be set up between a set of such groups so that each vector arrow going from place to place can be assigned a value which makes the whole vector sum come out to zero. They all cancel each other out."

I got it then, and my fists clenched. "Let me get this straight, Gerton. You mean there is no real project here? Eden Valley is doing nothing? *George Hamilton died for nothing?*"

"No! No, believe me, Derek, that's *not* what I mean!" He looked shocked. "Let me finish."

"Go ahead," I told him, "let's hear the rest of it."

"All right. Here's what we did. All over the United States there are different projects going on. None of them is particularly secret. They're all doing research work, doing it as research teams. But in each team, there is one essential element missing!

"That essential element is here, in Eden Valley. They aren't doing nothing, they're doing vital research. Now, what happens if a spy gets into one of those other places? He can't quite see what they're doing because there's something missing.

"Carry it further. What happens

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when a spy gets into Eden Valley? He sees a vast network of obviously related groups, all working toward some common goal. Material goes from one place to another; products are shipped all around. Some of them go into the tunnels under the mountain.

"Do you know what's under the mountain? It's a maze. Some of those secret doors won't unlock because they're welded shut. Others lead to a dead-end tunnel. Material goes in one place, gets shuttled around and comes out another, and from there it goes right back into the circuit.

"Now, no one man knows what's going on in any other section than his own—or at most a couple of others. He can't see the whole picture, and until he does, he can't see that the whole process cancels out. Each little group is not only doing useful research, but is actually *producing something useful.* That something is taken elsewhere and used as raw material to make something else.

"It's like the two chemists. If each saw that the other was undoing his work, they'd both give it up as silly. But if they *didn't* know—" He spread his hands.

"But *why?*" I asked. "Why such an elaborate set-up?"

He leaned back in his chair and lit a cigarette. "Derek, just as it stands, such a system would admittedly seem inefficient. But"—and here he smiled—"I pride myself on having devised the most fiendish spy trap that ever existed. The way it works—"

And that's where I interrupted him. "Let *me* tell *you* how it works!" I was actually excited. The whole thing had hit me like a sunstroke in the Sahara.

"You're just about the most vicious mantrapper I ever met," I said, and I was grinning when I said it. "I know how an espionage system works, and I know how its psychology works—how it *has* to work.

"Here's a system—a project—that is obviously doing something—making something. What? Well, we'll send in an agent and find out. The agent gets in. Fine. What does he find out? *Nothing!* Absolutely nothing! Why? Because there's nothing to find out! Before he finds out anything, he'll get caught. He's got to stay here until he finds out what the project is for. And before he finds *that,* he's been here long enough to slip up. It would take forever to find out a secret that doesn't exist!"

"Suppose he does find out that there is no secret—or suspects it?" Gerton prompted.

"The home office probably won't believe him," I said flatly. "And even if they do, *they can't take the chance!* They've *got* to send their best men against it. Their lower-class agents don't get anything, so they have to send in their best men. And *they* don't get anything, either."

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Gerton nodded happily. "Exactly! But there's more to it than that. By checking the information flow and material flow from one section to another, and at every intermediate evaluation point, we are able to supply the computers in Statistics Section with the information necessary to calculate the perturbation coefficient of each of the homology groups—" He stopped. He'd evidently seen the look on my face. I was beginning to get lost.

"Put it this way," he said. "The perturbation coefficient is a measurement of the deviation from an arbitrary norm. If everybody in Eden Valley were perfect, the coefficient would be one point oh. The system would be one hundred per cent efficient. But nobody's perfect, so we have to accept a 'normal' curve rather than a perfect one. The normal curve averages out the average little slip-ups on the part of an individual. It will show up inefficiency like a sore toe.

"Now, by the very nature of his job, a spy *must* be inefficient. He's doing two jobs at once. But his efficiency will vary from day to day instead of remaining fairly constant as it does with the average man. When we detect such a fluctuation, we know we have our spy."

"So you pinch him and lock him up," I said.

Ed Gerton shook his head. "No such thing. You don't quite see how efficient this system is. We get out data on changes in the system within a tenth of a second and we can change the flow of the system to fit it. It's a feedback of information that compensates for the inefficiency of any given individual. Now, because of the efficiency of the system, we can afford to allow for the inefficiency of the individual. So we keep those spies right here—*working for us!*

"After all, in order to be a spy in a place like this, a man has to be a top-notch scientist. Why shouldn't we have them working for us at low efficiency instead of the enemy at high efficiency?

"Of course, every now and then, the perturbation coefficient of one or another will get too high and we have to make an arrest before things go too far. That scares the rest of them and prunes off the spy ring before it gets too large. Actually, 'spy ring' is too strong a term. The contact between the individuals is so slight that they can't pass enough information along to do much damage."

It made sense. Keep a check on every man, and if he looks fishy, make sure he's watched closely enough to keep his nose clean. According to Gerton's theory, a man would have to know almost everything about the project before he knew anything at all. And with the rigid set-up at Eden Valley, it would be almost impossible to get all the information together. Even I, with all my freedom, hadn't seen it.

And why lock up the spies? Weren't they essentially already in

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prison? How could they get out? Even Brettmuller must have known he couldn't get away; it was a sacrifice.

"Of course," Gerton went on, "I have to do all the checking myself. Statistics Section doesn't know what all those figures mean. I have to take them and run them through our computers here, and check all the curves personally.

"And I slipped up."

"How?"

"Don't you see? I should have *known* they'd get desperate! I should have *known* they'd try a direct assault! It's all there on the graphs! I should have seen it! But I didn't—I never even thought, really, how deadly something like this could be. It was . . . . well, it was a game."

I nodded. I was remembering how he played chess.

Suddenly his eyes brightened. "Hey! I think I know how I can correct that! I think—" He grabbed his pen and a sheaf of typing paper and began to print rapidly, filling the paper with neat symbols. He was mumbling almost happily to himself.

I stood up. "O.K., Ed. I think I get the picture. I've got to go get your system running again. I'll let you know when General Cordley gets here."

He didn't answer, so I left without saying another word.

After all, why should I interrupt genius at work?

THE END

THE ANALYTICAL LABORATORY

This time, we have a unique situation; the six stories in the August issue came out in what amounts to three tie-score pairs! Lord knows, the third decimal place on an "I like . . ." sort of question can't be considered very revealing; it could be displaced by the weather at the time, the girl friend —or the baby, as the case may be—turning stubborn . . .

So let's say it went this way:

PLACE	STORY	AUTHOR	POINTS
1.	The Promised Land	Robert Randall	2.66
	Top Secret	Eric Frank Russell	2.66
2.	There's No Fool	David Gordon	3.51
	Witches Must Burn	James E. Gunn	3.51
3.	The Far Look	Theodore L. Thomas	4.00
	Middleman	John A. Sentry	4.00

Incidentally, it's been a long time since any short story hauled itself up to first place!

THE EDITOR.

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THE TROUBLESOME DIMENSIONS

BY POUL ANDERSON

We, it happens, use length, time, and mass as the fundamental units against which all else is measured. It's obvious that these are the only proper fundamentals . . . or is it? Planck's Constant, which appears to be a true universal, is the quantum of action, a hybrid of time and energy . . .

Let's call him Przewalski, just to get away from the monotonously Anglo-Saxon names of science-fiction heroes. It does seem improbable that as small a minority of humankind as those of North European ancestry will forever be the leaders of Terrestrial civilization. Przewalski was an eminent young physicist, head of the scientific mission to Vega Five.

Explorers from the Solar System had turned out to be the first in this neck of the galaxy equipped with a hyperspatial drive; but man was by no means the only civilized race. In many respects the Vegans were ahead of us, and an exchange of knowledge was indicated.

Landing at the planet's largest city, the humans donned their airsuits, glare filters, spore repulsors, and a dozen other items required to keep them alive on this "terrestroid" world. The Vegans crawled hospitably forth to meet them, wagging tails in the most ceremonious manner, and led the way to specially prepared quarters. Banquets, receptions, the conferring of honorary degrees, and speeches on the "hands-across-space" theme took only a week—though to be sure, Vega Five has a ninety-hour

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day. At length Przewalski found himself conferring through a glass partition with his opposite number. The being's name was quite unpronounceable by any human—special voder equipment was needed for the discussion—so we will return to science-fiction tradition and call him Jennings.

"Getting down to business," said Przewalski, "the most obvious difference between the accomplishments of our two peoples is that we know more about hyperspace and you know more about radiation. You ought to, with this sun of yours! Suppose I ask you a few questions, just to start the ball rolling."

"What ball?" asked Jennings. When it had been explained, he nodded. "Oh, I see. The proper idiom is 'to strike the gong with vigor and enthusiasm.'"

Przewalski sighed, drew a deep breath, and went on: "I've heard that you have discovered a quantized structure in the photon. Could you outline the theory for me?"

"Easily. The structural unit is the *quwiggl* (rough approximation to a horrible noise) which is expressed in terms of *glutch* times *thirk*—Oh, dear." Jennings wrung his hands, all six of them. "Your linguists of the preceding expedition never did think to inquire about the special language of physics."

"Well, we can figure it out," said Przewalski. "Is the *quwiggl* a unit of energy?" Perforce, he used the Esperanto word for "energy." "That is, well, one form of energy is given by the *integral* . . . damn! . . . now let me see. Look, you have a certain *mass*, a certain amount of matter. Understand? You exert a certain *force* on it—a push, a pull. This *accelerates* it, makes it speed up. The force is equal to the mass times the acceleration, and the *work* done, the energy expended, is the force times the distance through which it acts. Understand?"

"No," said Jennings unhelpfully. "*Glutch* is—" He went into a long rigmarole. Przewalski finally got the idea that *glutch* was capacitance. Jennings realized what mass and energy are, but he thought of them as functions of capacitance, action, and radiation flux.

At the end of a rather unprofitable session, Jennings gave Przewalski some books on elementary Vegan physics. Then he crawled home, shaking his ears in mild dismay that the Earthlings should have based their physics on something so utterly trivial as mass.

Przewalski settled doggedly down to read his way through. He got past the first sentence, and stopped cold. What was a *huk*? Looking it up, he found it to be a unit of distance. It was the length of one side of a cube of water with a capacitance of one *glutchguggl*. Przewalski groaned and reached for his slide rule and Rubber Handbook.

He was going to be on Vega Five a long, long time.

All of which is a roundabout introduction to a most interesting and

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complicated subject, the matter of units and dimensions. It is one which, on the practical side, has bedeviled us for centuries with the end not yet in view. On the theoretical side, it touches the philosophical foundations of science.

Every traveler abroad has run into the problem of conversion. If a signpost announces it is forty-five kilometers to Paris . . . how many miles? The American or Englishman is so used to thinking in terms of his own weird measurements that he normally has to translate before kilometers and kilograms have real meaning for him. But this is a minor nuisance compared to what the technical student must go through. An electric motor puts out twenty horsepower . . . let's see, how many kilowatts does that amount to? One horsepower is 0.7457 KW, or is it the other way around? Probably as many examination questions are missed because of multiplying by the wrong conversion factor as for any other reason; humanely, most instructors only take off a few points for this mistake.

It seems grossly unfair that we must wrestle with twelve inches to the foot, five thousand two hundred eighty feet to the mile, sixteen ounces to the pound, two pints to the quart, and one hundred sixty square rods to the acre, when the non-English-speaking world has nothing more to do than multiply sensible units by some power of ten. Who's responsible?

As usual, no one person is to blame. Human history looks like a series of bumbling accidents. The metric system originated in France and was adopted during the Revolution. The Anglo-Saxon countries, including the United States, wanted nothing to do with any project nurtured by wild-haired regicides, and stayed with weights and measures going back to the Middle Ages. By the time we were able to look at it rationally, it was too late. There was too large an investment in machinery built in English units for us to scrap. Of course, machinery does wear out and can be replaced by freshly designed equipment, but skilled mechanics last somewhat longer, and they are used to thinking in inches rather than centimeters. To them a centimeter is only an intellectual concept, with no "feel." It would take many years to train our labor force into new habits, and meanwhile work would be slowed down. ("Micrometer reads 10.493 cm., now how many inches is that?") The long-range saving in time and effort would be worth the trouble, but mankind isn't noted for thinking very far ahead.

The European continent was fortunate. It had less industry in the Eighteenth Century than England, so the changeover was easier. Even so, it was not made overnight; the process was only finished two or three generations ago. Some people, like the Germans, helped matters along by slapping a special tax on everything not built or sold in the new measurements.

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Vestiges of the old system linger on. I have seen them in action. It is required by law in Denmark that groceries be sold by metric units; but it happens that half a kilo is approximately one pound. So the Danes still go to the store and ask for a pound of butter, receiving 0.5 kilogram.

Ironically, the United States *is* officially on the metric system. An Act of Congress in the last century created legal definitions of our English units in metric terms. But that's no help in everyday life.

Let's glance at the metric system and see what it actually is. Everybody knows that the meter was defined as a fraction of the Earth's circumference and that the gram is supposed to be the mass (not weight) of one cubic centimeter of water at four degrees Centigrade, the point of maximum density. But these are not the true definitions. After all, the eighteenth-century measurements were not too precise; any physical unit is subject to change as measuring techniques improve. Strictly speaking, the meter is the distance between two parallel scratches on a metal bar kept at a controlled temperature in Sèvres, France. The International Standard Kilogram is, likewise, the mass of a particular material object stored in the same vaults.

Still—those scratches have a finite width. There is a certain range of error which is too great for the modern physicist, dealing as he does with quantities like one electron mass. There has been a proposal to re-define the meter in terms of the wave length of cadmium red light, a standard which cannot easily be lost, stolen, or tampered with. But then, on the other hand, maybe those theorists are right who hold that the wave lengths of all radiations are slowly changing—

The same problem arises in creating units of time—which, thank God, are the same all over the world, though divisions based on twelve are rather clumsy in a number system based on ten. We can define the second as a certain fraction of the Earth's rotation period; but this period fluctuates occasionally, a phenomenon called trepidation, and in any case is gradually increasing because of tidal drag.

From the philosopher's viewpoint, science is a cat's cradle of interrelated phenomena, tied down to nothing except the immediate sense data of the observer. If the entire universe, including ourselves and our measuring instruments, is uniformly shrinking or expanding, we have no means of knowing it. The proposition is, in fact, devoid of empirical content.

But we have to start somewhere. As we make fresh discoveries, we must return to our basic concepts and give them fresh definitions. It seems unlikley that we will ever know just what is meant by a "centimeter," a "gram," or a "second." There will be definitions, both verbal and operational, but the full meaning, the total implication, will always escape us.

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All our units are arbitrary. The circumference of the Earth, its rotation period, or the density of water can scarcely have any cosmic significance. It has been suggested that we might adopt a set of "natural" units, based on such quantities as the rest mass of the electron, the associated wave length, and the velocity of light. Such systems have been worked out. But they don't represent any great gain: they are subject to the same errors of measurement, the same prospect of future revision. Nor do they simplify calculation, since other natural quantities are not neat multiples of the proposed base units.

It appears that the metric system is still our best bet. Physical scientists throughout the world have been sensible enough to adopt it, in the CGS form—the fundamental units being the centimeter, the gram, and the second. There is, however, another metric system favored by engineers, the MKS: meter, kilogram, and second. The difference is more than a question of which power of ten to multiply by; certain quantities and equations, especially in electromagnetic theory, assume different forms and dimensions because such other natural constants as the permittivity of free space have been assigned different values. Personally, I was weaned on CGS and am prejudiced in its favor, but I must admit that MKS is easier to use in some branches of physics.

I am pretty sure that the English-speaking peoples won't hold out forever. Eventually Americans, too, will be measuring their distances in kilometers, though no doubt the British will make exceptions for such ancient streets as the "Royal Mile" of Edinburgh. The "Royal One-point-six Kilometer" just doesn't sound right.

But when we start dealing with extraterrestrial civilizations — oh, brother! The inhabitants of Jupiter, if any, may be able to tell us a lot about high-pressure chemistry. But look at a handbook, with its million or so entries, and imagine having to convert everything from *snorks* (3.98742 inches) to centimeters! The Jovians will sit back and grin, because *their* system is based on the number eight, the sidereal year of their planet, and the physical properties of ammonia at standard Jovian temperature and pressure.

Of course, this is only a mechanical problem, which we could turn over to computers. But suppose the aliens use an altogether different set of basic concepts?

This brings us to the meat of the present article: the question of dimensions. For those who have not worked in physics, dimensionality is a complex topic, and even professional scientists rarely realize the full implications.

That word "dimension" has been grossly misused in science-fiction, and we had better take time to see what it really means. In workaday language, a dimension is a length, as when we say the dimensions of a box are 6'x6'x10'. It's clear enough

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that the "length" of an object is arbitrary and can be measured in any direction.

We also speak of three-dimensional space. This means no more and no less than that three co-ordinates are necessary and sufficient to define a point in that space. A line is a one-dimensional space: having once fixed a zero point, we need only a single number to specify any other point in the line. A sheet of paper is two-dimensional: we have to draw an *x* and a *y* axis. All the above are Euclidean. But a curve may be thought of as a one-dimensional space, the surface of a sphere as a two-dimensional space, and so on; these are the nonEuclidean spaces encountered by the average man.

But suppose we are investigating the physics of gases. In order to determine precisely the state of a gas, we must list a great many quantities, such as molecular weight, pressure, temperature, degree of ionization, and so on. The biologist, and still more the sociologist, must denumerate hundreds or millions of independent variables to specify a state—in these two cases, we still don't know what most of the variables are, we only know there are a lot of them. The total state of the system is a function of all these variables, and if each of them is given a numerical value, the function gets a value, a single number, which describes a single state of the system.

Therefore—*any such function can be thought of as a space with a dimensionality equal to the number of independent variables needed.* Such a space is known to mathematical physicists as a "phase space," and can have any old number of dimensions. Thus, the phase space of a system of electrons has three dimensions for *each* electron involved. Every point in a phase space defines a certain state of the system under consideration.

Ordinary Euclidean 3-space, such as man once imagined himself to inhabit, is merely the phase space of a single rigid body. The only thing it describes is the position of such a body. In principle, it doesn't even have to be Euclidean.

One of the non-Euclidean spaces is of particular interest, being that of the relativistic universe. We might as well be clear on one point: it is not legitimate to say that the cosmos *is* a Riemannian space. What we mean is that the theoretical geometric construct of relativity is Riemannian, and that there appears to be correspondence between this "map" and the structure of physical data.

As everyone knows by now, the Einsteinian universe is four-dimensional: besides the usual *x, y,* and *z* co-ordinates, we need a fourth *t* co-ordinate to specify the time of an event. What is not so well known is the fact that this *t* co-ordinate does not have the same character as the others. You can transform an *x* axis into a *y* by a simple rotation, but the transformation of *t* involves multiplication by the velocity of light and the square root of minus one.

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From all the foregoing, it should be plain that the old science-fiction theme of Invaders from Another Dimension is pure nonsense. You might as well speak of Invaders from Length. In fact, it's precisely as meaningful to speak of Invaders from Hunger.

Because actually *a dimension is any measurable quantity in which we happen to be interested.* You can plot the alcoholic content of beer against the temperature of fermentation every bit as readily as you can plot the position of a bullet against the time it left the gun. A dimension can be length, time, weight, electric charge, cost, birth rate, pie-eating ability—to borrow an example from L. Sprague de Camp—or anything else.

But naturally some dimensions are a trifle more fundamental than others. Pie-eating ability can be expressed as mass consumed per second, whereas it would get rather complicated if we defined mass and time in terms of pie-eating ability.

Newton made clear the distinction between mass and weight. (Though some science-fiction writers, whose heroes have no trouble picking up a thousand-ton spaceship on a small asteroid, still haven't gotten it through their heads.) Mass appeared to be a basic quantity, the mass of an object would be the same anywhere in the universe. Length seemed another such fundamental unit, since area and volume can be expressed as powers of length. And time could hardly be questioned in those days; how would they have defined time as a function of anything else?

It has been shown that three dimensions are necessary and sufficient to describe all the quantities of physics. The three we have chosen on Earth are mass, length, and time. (I pass over the rather difficult question of temperature.) For instance, velocity is distance (length) per unit of time; acceleration is velocity per unit of time; force is mass times acceleration; energy (work) is force times distance . . . and so on. These dimensions behave exactly like ordinary algebraic symbols.

This point must be emphasized if we are to develop our line of argument. Let's abbreviate mass, length, and time as m, l, t respectively. Then velocity has the dimensions lt^{-1}, acceleration lt^{-2}, force mlt^{-2}, energy ml^2t^{-2}, and so on. (For the benefit of those whose algebra is even rustier than mine, a negative exponent indicates division and a fractional exponent the root to be extracted.) It is worthwhile showing a case in which the dimensions of some quantity are to be found. How about electric charge?

In the CGS (electrostatic) system, the force between two charges in free space is equal to the product of the charges divided by the square of the distance between them. If I may be permitted an equation, this is

$$F = \frac{q^2}{r^2}$$

assuming that the two charges are

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equal. By simple algebra, then,

$$q = rF^{1/2}$$

or, in dimensions, $l(mlt^{-2})^{1/2}$. Working this out, we see that the coulomb is $m^{1/2}l^{3/2}t^{-1}$. In verbal language, a coulomb is the square root of a gram times the cube of the square root of a centimeter, per second—a ghastly mess, but perfectly unambiguous.

I solemnly swear that the above are the only equations in this article.

Certain quantities are dimensionless, e.g., specific heat. This does not make them any less real, it only indicates that they are comparative. The late Sir Arthur Eddington found dimensionless quantities which were algebraic combinations of such natural constants as Planck's—one of them, for example, was the ratio of mass between the electron and proton. These Eddington numbers are independent of the units chosen; the ratio of two masses is the same whether they be expressed in grams, pounds, or Martian *ziks*. He then set himself the incredible task of deriving these numbers from a few simple axioms. His death cut short a work which might have changed our whole concept of the nature of the universe, of logic, and of the human mind. But that is unfortunately not relevant here.

The dimensions of some quantities depend on those chosen for others. Thus, if we wished, we could make the gravitational constant a dimensionless absolute with a value of unity, but this would require us to define either mass, length, or force differently.

This simple case illustrates a surprising and important fact which has hardly been noticed by anyone. We have to choose three fundamental units, yes, but *which* three we choose is, in principle at least, arbitrary.

As a matter of fact, there is already one set of units which does not take mass as a starting point. This is the FPS (foot-pound-second) system of the English-speaking engineer, in which the pound is not a mass but a force. Here on Earth it makes small practical difference, but out in space, in free fall, the distinction between mass, a scalar, and force, a vector, would rapidly become obvious.

But all this is pretty small potatoes when we think of the systems which extraterrestrial scientists might pick.

Mass, length, and time looked fundamental to our ancestors, and we are now stuck with them. But a native of Vega Five might attach more importance to the amount of radiation he is getting per square centimeter per second, the energy flux, than to the total amount he receives in a day. When his giant sun stands at high noon, the flux might be too great for him to venture outdoors. His physicists could well have substituted energy flux for time—though from his viewpoint, it's we who have switched things around. And come to think of it, when you travel from one place to another, it isn't the distance you're primarily interested in, it's the energy and time required to make the trip. In this sense, a round-

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about road, well-paved and with little traffic, is shorter than a straight but overcrowded highway; you can go faster and more easily on the first route. So the Vegans might well imagine action (energy times time) to be more important than a mere distance—an attitude which would pay off when they got around to developing quantum theory. As for their third basic unit . . . well, suppose their early scientists happened to find out more about electrostatics than mechanics. (This could have happened in the Hellenistic era of Earth, but didn't.) They would be inclined to think of the capacitance of a body as more important than its mass. When they eventually figured out statics and dynamics, they would get the idea of mass all right, but for them it would be an auxiliary concept rather than a basic one.

Or take Hal Clement's fine novel "Mission of Gravity." You remember that his planet Mesklin was enormous, flattened out by its terrific rotational speed, with the force of gravity radically dependent on the latitude you happened to be at. In their prescientific age, the Mesklinites would have no way of realizing that mass is constant, but they would be acutely aware of the changing force on them as they traveled about. Under the high gravity of the polar regions, they could never get up much speed, but the acceleration of a falling body would be an important characteristic of any locality. And when they began to breed physicists, the rapid rotation of the planet would suggest an intensive study of spinning bodies. It would soon become clear that the weight and size of a rotating object were less useful in predicting its behavior than the angular momentum.

So let us imagine that the Mesklinites worked out a physics based on force, acceleration, and angular momentum. Let us call these dimensions f, a, and w respectively. Then let's see what their other units would become.

The accompanying table shows three systems of dimensions. The first column represents the CGS system of Earth. The exponents of mass, length, and time are shown in that order. For instance, we read from the table that torque has the dimensions ml^2t^{-2}, gram-square centimeter per second per second, the same as energy. To find the corresponding Mesklinite units, set up their f, a, and w as functions of m, l, and t, and solve for the latter; then you can go right down the CGS column making substitutions to get the faw column. We find, then, that on Mesklin torque has the dimensions $f^{1/2}a^{1/2}w^{1/2}$, the square root of force times acceleration times angular momentum.

Some interesting details show up. Velocity and acceleration have the same dimension, a. A Mesklinite understands the difference between speed and the rate at which speed is acquired, but it isn't a really fundamental distinction to him. His mass, length, and time are rather messy

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TABLE OF DIMENSIONAL SYSTEMS

Quantity	mlt (CGS)			faw			eiq		
Mass	1	0	0	½	−3/2	½	1	0	0
Length	0	1	0	−½	½	½	0	1	0
Time	0	0	1	−½	−½	½	0	1	0
Velocity	0	1	−1	0	1	0	0	0	0
Acceleration	0	1	−2	0	1	0	0	−1	0
Energy	1	2	−2	½	½	½	1	0	0
Force	1	1	−2	1	0	0	1	−1	0
Angular velocity	0	0	−1	½	½	−½	0	−1	0
Moment of inertia	1	2	0	½	−½	3/2	1	2	0
Angular momentum	1	2	−1	0	0	1	1	1	0
Torque	1	2	−2	½	½	½	1	0	0
Action	1	2	−1	0	0	1	1	1	0
Electric charge	½	3/2	−1	0	½	½	0	0	1
Electric potential	½	½	−1	½	0	0	1	−2	−1
Electric field	½	−½	−1	1	0	−½	1	−1	−1
Electric current	½	3/2	−2	½	1	0	0	−1	1
Magnetic field (H)	½	½	−2	1	½	−½	0	−2	1
Magnetic induction (B)	½	½	−2	1	½	−½	1	−1	−1
Permeability	0	0	0	0	0	0	1	1	−2
Dielectric constant	0	0	0	0	0	0	−1	−1	2
One-body capacitance	0	1	0	−½	½	½	−1	2	2
Inductance	0	−1	2	−½	−3/2	½	1	0	−2
Resistance	0	−1	1	0	0	0	1	−1	−2
Permittivity	0	0	0	0	0	0	−1	−1	2

functions of f, a, and w. He would, of course, have names for such quantities, just as we speak of "coulombs" rather than of $m^{½}l^{3}/^{2}t^{-1}$. Electrical resistance turns out to be dimensionless, a comparative quantity. Planck's Constant, as with us, has the dimension of angular momentum, but the Mesklinite student would see this at a glance, while we must have it

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pointed out to us. On the other hand, he would be slower to realize that one-body capacitance has the dimension of length.

Earth, Jupiter, Vega Five, Mesklin—in a welter of such conflicting units, the scientists of an interstellar civilization would have some trouble exchanging information. Perhaps they would get together and try to work out a universal set of dimensions, corresponding to qualities they believe to be genuinely fundamental. After all, we on Earth can see that the Vegans and the Mesklinites were being arbitrary to the point of frivolity; as for us, Einstein has shown that mass, length, and time are not universal constants either but dependent on the velocity of the observer.

Electric charge would be a good base point for this new interstellar system. Energy seems to be quite important too. And for our third quantity, how about interval? This is given by the square root of X^2 plus Y^2 plus Z^2 minus c^2T^2, where X, Y, and Z are the spatial distances between two events and T the time between them. Though X, Y, Z, and T may all be measured differently by different observers, the interval is invariant—the same for all.

The third column of the table shows an energy-interval-charge (eiq) system of dimensions. It is not converted directly from CGS, but embodies some advantageous features of MKS. You will note that mass has the dimension e, which was to be expected, and velocity is dimensionless, which reflects well the fact that velocity is relative. Acceleration comes out to be i^{-1} and force is ei^{-1}, energy per unit of interval. Not bad. It becomes still more attractive when we see that the eiq system is entirely free of those fractional exponents.

But there's a catch. Some quantities which are dimensionless in CGS acquire dimensions in eiq. Capacitance and resistance have more complicated dimensions in eiq than in CGS.

In short, we have gained little except, possibly, a neutral system which would not offend anyone's planetary pride. And this is not very surprising, because we don't *know* that e, i, and q are the building blocks of the universe.

"Let us carve nature at the joints," said Francis Bacon, meaning that we should adopt definitions and make distinctions corresponding to real differences in the physical world. But nature's joints turn out to be rather elusive; in fact, it seems likely that nature is a seamless unity. We carve up the universe of phenomena because that's the only way our minds can deal with it. But it is sobering to think how many supposed fundamentals exist only in our own heads.

THE END

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SOURDOUGH

BY ROBERT SILVERBERG

Illustrated by van Dongen

If a device reacts to a purpose, instead of to an object—you can't use it if your purpose is to test it! Because that isn't the purpose it was designed to react to!

McKenty was prospecting the low-lying approaches that led up to Short Pine Hills, in the uranium country of South Dakota. It was desolate, flat land, dark and muddy-looking, barren of vegetation. The ground he was covering was mazed with twisting gullies and crosscut canyons, and the small, compact Geiger slung over his shoulder was ticking out its steady melody, always threatening to burst into the furious chatter that indicated a concentration of radioactives, but never quite doing it.

It looked like another blank day. He'd been in the Badlands over a

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week on this current jaunt, living out of a tattered sleeping bag spread under his old pup tent, cooking his meals over a canned-heat stove. He'd left his trailer up in North Dakota, near Bullion Butte, and he had traveled the intervening distance on foot, hoping that he would hit a uranium concentration somewhere in the Badlands lignite region.

With international affairs hovering on the thin edge again, and all the orthodox sources of radioactives being tapped frantically to meet the demands of the stockpilers, McKenty had boldly decided on striking out on his own in the Dakotas. The stuff was there, somewhere in the carbonaceous flatlands, and if he could find a practicable concentration he'd be set up for years.

There was just one hitch. He wasn't finding any.

The Geiger dangling from the leather shoulder strap continued to cluck pleasantly. *I ought to be using a gamma detector,* McKenty thought gloomily, as he wandered on toward the distant, upthrust butte that was his stopping-point for the day. *Geigers are out of style. But who can afford one of the new things?*

That was the trouble with this business, McKenty reflected. Your equipment gets outdated as fast as you can buy it—and if you don't strike a lode often enough, you can't afford to replace it.

He stopped after about three miles more, and sat down beneath the eave of a small, rock-capped butte that rose straight from the ground just in front of him. He lit a pipe and sucked it moodily, watching the bluish smoke go filtering into the air. He looked around, studying his surroundings.

His job took him into some pretty empty places, now and then. Alaska, for example—though the yield he'd made, that fine year of '61, had more than recompensed him for the dreary, lonely summer. But this place took the cake. Hundreds of miles of eroded nothing, and no recompense in the offing to make things any nicer. He began to think that he'd been crazy to come out here.

After a while, he pushed himself to his feet and resumed his journey, first consulting his compass to make sure he'd be able to get back to his camp, twelve miles behind, at close of day.

He moved on for one more fruitless mile, and then stopped, aghast. He passed a grimy hand over his face, and frowned in dismay. Was he starting to crack—or was that a house, perched precariously atop a low butte not too far ahead?

It turned out to be a house, all right—small, badly constructed, with uneven brown shingles running down its lopsided roof. McKenty stared in bewilderment at it for a long while, wondering just what sort of person would build a house out here in the Dakota Badlands.

The answer was obvious: a hermit. In all probability, a most antisocial, unpleasant, crochety sort of fellow who might drive visitors away with

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a shotgun loaded with salt pellets.

Or maybe not. McKenty didn't know—and he hadn't seen another human being for almost a week. Impelled half by curiosity, half by his natural and usually-suppressed gregariousness, he climbed the winding path that led to the summit of the butte.

The house leaned badly. It had been built by an amateur. McKenty regarded the oak expanse of the front door doubtfully for a couple of moments, and then knocked-loudly, twice.

"Hello, there!" he called. "I'm a prospector wandering through the neighborhood. You mind if I step in for a while?"

There was no immediate answer, and in the long silence McKenty thought he heard the sound of machinery humming and grinding within. Then the door swung open, and a man stepped out.

He was of middle height, fortyish, heavily tanned, with intense blue eyes, graying hair, and a short, unkempt, light-brown beard. He smiled openly, disarmingly.

"Come on in, stranger. You're the first company I've had in two months!"

Without waiting for further invitation, McKenty followed the other inside. He found himself in a room as cluttered as the surrounding territory outside was empty.

A glowing neon tube arced across the ceiling, casting a soft orange-red light; there were some orthodox light-fixtures as well, but they didn't seem to be in use. The left side of the shack was devoted to a tangled heap of machinery, gadgets of every possible description, pile on disorderly pile of strange and disturbing-looking goldbergs. McKenty blinked at the sight of it.

The rest of the place was fairly conventional: a small Army cot; a bookcase, made of an old orange crate, containing half a dozen thick books and some small, coverless magazines; a short-wave radio; a television set, not plugged in. (*What channels reach out here?* McKenty wondered.) Another room was visible in the back.

The recluse indicated an upturned, unpainted crate, and grinned. "Here, friend—have my best armchair."

"Don't mind if I do," McKenty said, and sat down gingerly. The crate yielded beneath his weight, but supported him. "I've had a rough day—a rough week, matter of fact. Lean pickings, around here."

"Are you hunting for uranium?" the other asked, pointing meaningfully at the Geiger dangling from McKenty's shoulder.

McKenty nodded.

"Uh-huh. There's always one or two, every summer," the recluse said. "Ever since word got around that there's uranium in these here hills, there's always been some fellow willing to tramp around here looking for it. Where's your jeep?"

"Haven't got a jeep," McKenty said, unwilling to confess just how low his finances really were. "It's a Studebaker, and it's not worth much

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for this kind of country. I left it back up north and made it down here on foot. That's the whole trouble—if I could find some uranium out here, I could buy a jeep so I could set out to look for uranium the right way. It's a circle."

"And the only way out is to strike it rich," the other said. He nodded. "I know the feeling. Frustrating, isn't it?" Without waiting for an answer, he got up and disappeared into the next room. "I'll put up some coffee," he called in.

"Fine," McKenty said. He was relieved. The "hermit" seemed civilized enough.

The stranger appeared again a few moments later, carrying two cups of coffee. "Name's Colville," he said, as he set the cups down. "Yours?"

"McKenty."

They sat silently for a few moments, and then McKenty looked up and said, "I hope I'm not being inquisitive, but—"

"I know," Colville said. "You've been wanting to ask me, what in blazes am I doing out here alone on the edge of nowhere? The answer's a simple one, and I don't mind telling you. I'm getting away. I have a project going, and the only way I can carry it out is to come out here where no one can bother me. I come here every summer—I teach, the rest of the time. Texas Tech."

"Oh," McKenty said. "Doing research, eh?"

Colville nodded. "Uh-huh. Psionics research. I'm a professional crackpot."

McKenty covered his feelings by taking a deep sip of coffee. Then he looked up, glancing from the cluttered workbench to Colville nervously. "Psionics, you say? You mean brain-powered autos and things like that?"

"I detect a certain note of healthy skepticism," Colville said. He finished his coffee and stood up again.

"Not at all!" McKenty protested defensively. "I just—"

"Don't bother," Colville said. "It's the reaction I expected. That's why I come out here—where none of my colleagues on the faculty can get wind of what I'm doing. It's simpler to work that way, for now. And I'm an amateur geologist, too. This is interesting country from that standpoint."

McKenty, troubled, toyed with the laces of his high boots. "I don't mean to run your work into the ground, of course, but . . . but . . . psionics has always seemed like fairy-tale stuff to me."

"So it is," agreed Colville gravely. "Fairy tales, exactly." He gestured at the workbench. "If I told you what some of these things can do—sometimes—you'd laugh at me. Worse than that; you might try to get me locked up. So I won't tell you."

"I'll take it on faith," said McKenty. "I'm in no mood for arguing psionics with anybody."

"Troubles, eh?" Colville asked sympathetically.

"Troubles," McKenty said.

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Half an hour later, they were finished talking about McKenty and his difficulties in finding uránium, and were discussing psi again.

"I won't believe it," McKenty said stubbornly. He found himself getting more and more irritated by Colville's refusal to assert any definite point of view that could be argued against. The gentle-voiced recluse would merely say, "I *think* it'll work—" and leave it at that.

"I won't believe it," McKenty repeated. "Machines just don't work that way."

"What way?"

"Without rules, without sense. Look," he said, hefting the square Geiger counter. "Here's a machine—a regular kind of machine. When it's near the right kind of radiating particles, it does a lot of ticking. When it's not, it hardly ticks at all. It works that way all the time. You can count on it."

Colville smiled. "It hasn't done you much good lately, has it?"

"That's no fault of the counter," McKenty retorted. "I just haven't been in the right places."

"Um-m-m," Colville said reflectively. "Suppose . . . just suppose I could build you a machine that would *take* you to the right places—that would find uranium for you. You say there definitely is some out here?"

"Somewhere," McKenty said. "Other prospectors have made finds near here. The stuff's pretty diffuse, but the new mining process they've developed makes it possible to extract it from the lignite beds."

"All right," Colville said. "Let me build you a psionic doodad. Then we'll turn it loose out here and see what happens."

McKenty started to snap an angry refusal, feeling insulted, and then he realized the futility of such an action and he started to chuckle. What if the recluse *had* something? It didn't seem likely, of course, but it wasn't right to prejudge him. Besides, you never can tell. And if the "doodad" didn't work, well, that would settle the argument about psionics pretty well, or at least give McKenty a good edge.

"O.K.," McKenty said finally. "You build your thingumajig and I'll try it. In the meantime I'll stick to my Geiger."

McKenty stuck to it, and two days more went by, during which he ranged a little farther south toward Short Pine Hills, without detecting anything worth digging for.

On the third day, as arranged, he returned to Colville's shack. The short man was waiting for him. He was wearing a much-begrimed lab smock, and the room smelled of a recently-used soldering iron.

McKenty sniffed. "What do you use for flux? Old seaweed?"

"It's all my own invention," said Colville. He crossed the room to the workbench and extracted a long, thin rod from the jungle of gadgetry thereon.

"Here," he said. "One genuine,

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guaranteed, home-made psionic dowsing rod. Specially adapted for uranium-hunters."

McKenty took the rod gently from the older man and looked at it, examining the circuitry on the under side. "Pretty good job of wiring," he commented, at length.

"Thanks," Colville said.

McKenty met the other's eyes and stared at him for a long moment. Finally he said, "Come off it, Colville. You don't expect me to fall for this, do you?"

"Of course not," Colville said, shrugging. "It's not a matter for faith. Why don't you try it out and see if it works?"

"Do you seriously think that—" McKenty started, and then stopped, feeling foolish. Colville was right. There was no sense in arguing over whether the machine worked or not. The thing to do was to try it. He'd been joshed into a position where the only sensible path was that of giving the rod a serious trial.

He looked up. "How does the thing work?" he asked. "Assuming that it does work, anyway. What's the theory?"

"There's uranium down there," Colville said. "Scattered in that lignite bed. It can be detected psionically—aside from being findable by such orthodox, if clumsy, things as gamma detectors. You might say it's radiating the fact of its presence—something the prospector wants desperately to know. The trouble is your mind's not selective enough to pick up the signal; the noise level's too high. That's where the rod comes in. Call it a transformer. It steps down the noise and boosts the signal so you can pick it up."

McKenty coughed deliberately. "You sound dead serious, you know."

"I am," Colville said simply.

McKenty shook his head. "I don't know," he said. "You *look* like you're sane. Well, suppose we try the thing out. Let's go see if the uranium wants to be found."

They left at once. "That's the nice thing about living way out here," Colville observed, as they made their way down the side of the butte. "It's not like living among civilized people—out here you don't have to bother locking your doors when you go out."

"I guess not," McKenty agreed, looking around at the wide-spreading wasteland. "And you never have snoopy neighbors, either. Or any kind of neighbors, for that matter."

"I get some prospectors occasionally," Colville said, "but you're the first who's stayed for longer than a cup of coffee. They all seem to think I'm a mad scientist, and beat it as soon as they can."

"I think you're a mad scientist, too," McKenty said.

"I know. But it's an opinion that can be changed. You're flexible; the others who came by weren't. They were sure I was crazy—but if that rod works for you, you won't think so."

"I'm not so sure of that," said

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McKenty. "Maybe I'll just think I'm crazy, too."

"Maybe. Well, here we are," said Colville. "Ready?"

Grasping the rod in the middle, McKenty hefted it and looked suspiciously at Colville. "What do I do?"

"Take it by the handle, first—not in the middle, like that. Grab it like you would a tennis racket."

McKenty slid his hand down along the cool metal until he was holding the rod by the thick rubber handle at one end. He fidgeted.

"Comfortable?" Colville asked.

"No," McKenty said. "It feels topheavy. Doesn't sit right in my hand. Your handle's too big for my grip, or something."

"Are you sure? Try shifting the rod around a little."

McKenty juggled it in his hand, and shook his head. "Still doesn't feel right."

"O.K.," Colville said. "We're ready to begin. Suppose you try pointing the rod in different directions, now, and concentrate on uranium. Maybe when you've got it in one certain direction, you'll discover the rod suddenly feels right."

McKenty started waving the rod in different directions. "You should live so long . . . *hey!*" He stared down at the slender rod as if it had turned to a live viper in his hands. "It's . . . all right, now," he said slowly.

Colville chuckled. "Didn't believe me, eh?"

McKenty held the rod out before him, and wiped a bead of sweat away. The rod felt comfortable now. It fit his hand like the right-sized shoe, or like the right kind of hat adjusted in just the way he liked. Something about the rod had changed. Palpably, undeniably, unmistakably, impossibly *changed.*

"Go ahead," Colville urged. "Follow your nose, now."

Without saying anything, McKenty started to walk. The rod led him down a ravine, into a gully where the dark stratum of lignite stood out against the eroded sides of the hill like a thick black thread running just below the butte's cap rock. From there, it took him across a curved canyon, up around a scrawny-looking fir tree whose needles were gray and limp from lack of nourishment, and over a bed of volcanic rock.

The rod drew him on. Whenever he deviated from true, he sensed the subtle change in the feel of the handle—and when he returned to the proper trail, it nestled in his palm once again. Colville, smiling quietly, walked at his side, saying nothing, occasionally tugging thoughtfully at his beard. McKenty realized that he was being allowed to find out for himself just how much of a crackpot the psionicist was.

"When do I stop?" McKenty asked, after they had gone on another hundred yards. The sun was high overhead now, and McKenty was sweating profusely—and not entirely from the heat.

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"You stop when the rod indicates it," Colville replied.

The rod did nothing for a while longer except lead McKenty silently onward. Then, suddenly, it twisted downward to point at the ground below.

"It's dipping!" McKenty exclaimed.

"It's dipping," Colville agreed. "This is the spot. Listen to your Geiger, now."

In the intensity of his concentration, McKenty had forgotten all about the Geiger over his shoulder. He had been so completely absorbed in the workings of Colville's doodad that he hadn't been listening to the clicking.

He listened now.

The counter was going wild.

Six weeks later, when McKenty had made his stake, filed his papers, brought in assayers, and subsequently sold his claim for a handsome figure when it was definitely proven to be uranium-rich, he returned to the wobbly shack on the top of the butte.

He knocked vigorously. "Colville?"

"Come on in." McKenty pushed the door open, and saw that Colville was packing. The workbench had been cleared off, and a heap of cardboard cartons had been pushed carelessly together in the middle of the floor.

"Summer's over," Colville said. "Time to go back home."

"Taking all your gimmicks with you, eh?"

"Of course," Colville said. "I've done all I can do here. The thing to do now is to go back and complete my researches the way they have to be completed." He paused. "Did your negotiation with the mining company come off all right?" he asked, as he wound some heavy twine around a flimsy-looking carton of radio tubes.

"That's what I came back to see you about," said McKenty seriously. He sat down carefully on the edge of the workbench.

"I want to ask you some questions."

"Question away," Colville said.

"Look here," the prospector said, "I made quite a pile out of that lode you found for me, you know. Enough cash to get out from under my hole, and then some."

"Glad to hear it," Colville said, grinning.

"O.K. I made a lot of money because you let me use your machine." He leaned forward. "But there's some catch in all this, and I want to know what it is."

"Catch?"

"Yes, catch," McKenty repeated. "Listen—you're not a rich man. You probably draw a miserable salary at your college, and all this gadgetry of yours requires dough. More dough than you've got. Right?"

Colville nodded.

"O.K., then. You've got a machine that can make money for you. It can find uranium—and in today's market, that's real money. So what do you do? You put all that money in my

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pocket instead of grabbing it yourself. I don't get it, Colville. How come you're so altruistic, when you're obviously hard up for cash?"

The psionicist turned slowly to face him. "Altruism? What altruism? Look, son, do you know how that rod works?"

McKenty shook his head. "You made some sort of explanation, but not in enough detail to make sense."

"Well, listen, then. It's a three-phase setup. In order to find uranium with the rod, three factors have to be in alignment. Any idea what they are?"

McKenty thought for a moment. "Well, you've got to have a uranium deposit to start with," he said.

"Right. That's the first factor. There's got to be uranium somewhere within the effective range of the instrument—which is about ten miles around. The second factor is the rod itself, of course."

"And the third?"

Colville remained silent for a moment, and McKenty noticed a strange grin, half expressing amusement and half a less definable feeling of pain, starting to turn up the corners of Colville's mouth.

"The third factor," Colville said, finally, "is that you've got to have a genuine, deep-down desire to find what you're looking for. Finding uranium has to be the be-all and end-all, if you know what I mean. That's the thing that makes the rod work. Without it, it's just a bunch of circuits."

McKenty, puzzled, let his eyes stray around the room. After a moment, he glanced back at Colville. "What are you driving at?"

"The rod won't work for me," Colville said bluntly. "The third factor's not there."

"Huh? But you want uranium just as bad as—"

"Not so," Colville said. "*You* want uranium. I wouldn't mind having it, but that's not the same thing. The main thing on my mind is my machine. I want it to work. I concentrate on making it work. And, of course, it *doesn't* work."

"Because you end up concentrating on the machine, instead of on the uranium," McKenty said.

"That's it," agreed Colville.

"Hm-m-m. Couldn't you try not to concentrate on the rod, then?" McKenty suggested.

Colville chuckled. "Suppose I order you not to think of a hippopotamus," he said.

"I get what you mean." McKenty stood up and stared levelly at the psionicist. "So your machine just won't work for you, simply because you want it to work so darned bad, And you can't outbluff the machine."

"I can't fake a belief," said Colville. "Not directly, anyway. But I can get around the machine by adding a fourth factor."

"Fourth factor?" asked McKenty suspiciously.

"Yes," said Colville. "*You.* I can't make the rod work—but if I could make you make the rod work, that would be almost as good, wouldn't

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it? So when you blundered in here, I put you in a position where you'd give it a try. You did."

"And got rich. That's still altruism, isn't it?"

"Not at all. I was using you for my own ends. I proved that the rod would find uranium, which is something I didn't know definitely as long as I couldn't test it myself." He smiled. "I'm glad you came back. You're the kind of man I'm looking for."

"What do you mean?"

"What would you say to a scheme whereby I supplied bigger and better mineral-finding devices for you to use, and we'd split the profits fifty-fifty?"

"Pool our assets for mutual benefit, eh?" the prospector asked.

"Something like that," said Colville. "You'd be able to make use of a darned-near-infallible locating device—and I'd have a source of cash to carry on further research. What do you say?"

McKenty studied the older man for a moment, struggling to understand him. "Your biggest dream is to have one of your own machines work for you, isn't it?" he asked finally.

Colville nodded slowly.

"And it can't ever happen," McKenty said. "Your machines can only function for other people."

"There's some satisfaction in helping others," said Colville.

McKenty felt a sudden surge of pity run through him. *Yes, satisfaction,* he thought—*but not complete personal fulfillment. Poor devil, he's condemned to be altruistic. He couldn't be selfish if he wanted to be.*

"You'd make the gadgets, I'd use them," he said out loud, considering the proposition. "We'd split fifty-fifty—and we'd get filthy rich. We could pave the Badlands with platinum."

Colville chuckled. "Sounds fine. We ought to make lots of sweet money together."

He must be terribly bitter, McKenty thought. *All his brains, and he can't make his own gadgets work.*

Then he looked again. There was no trace of bitterness to be seen on Colville's face.

Suddenly, McKenty realized that it was impossible for Colville to be bitter. The very nature of the thing Colville was doing precluded any personal, direct success, and Colville knew that. It was a drawback inherent in the nature of the research. That sort of man couldn't be bitter. Mildly frustrated, yes, in an amused way—but bitter, no.

"O.K.," McKenty said, understanding it now. "Sure—I'll be glad to be your partner."

THE END

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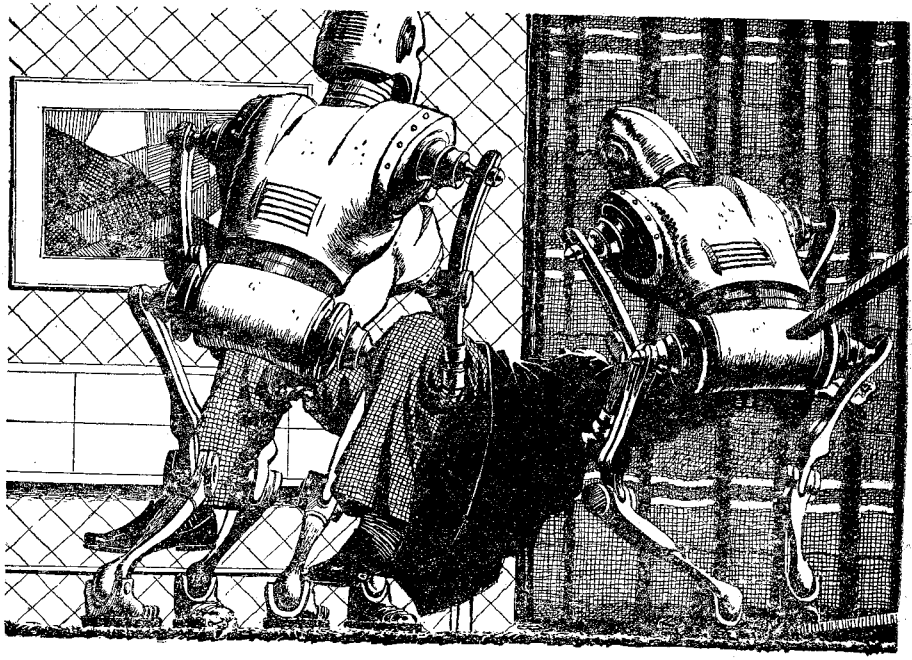

THE NAKED SUN

Second of Three Parts. ***Lije Baley was investigating a murder. Usually, an alibi proves physical impossibility; on robot-dominated Solaria, a different question arose. Is a robot's conditioning "physical" or "psychological" impossibility? And is there any such thing as "psychological impossibility"? And if it exists for robots, does it for humans...?***

BY ISAAC ASIMOV

Illustrated by van Dongen

Earth is a crowded world consisting of underground Cities of enormous size. It makes use of relatively few robots. Individual Earthmen are never out in the open air and are acute agoraphobes.

Some fifty planets in the galaxy are colonized by descendants of

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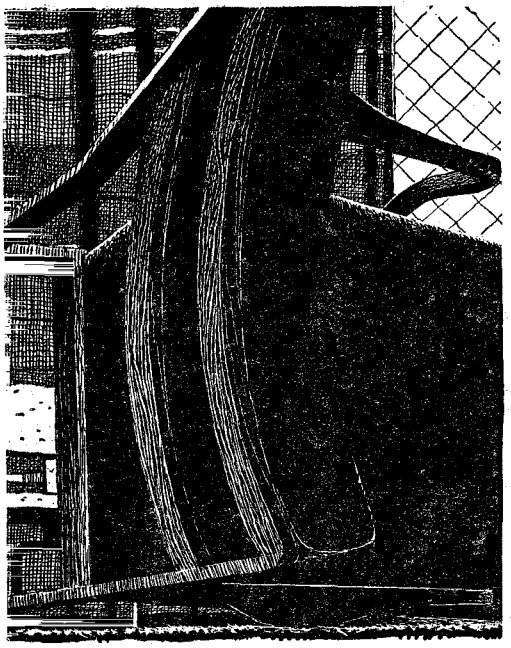

Earthmen. The planets are the "Outer Worlds"; their inhabitants, the "Spacers." The Outer Worlds are underpopulated by Earth standards. The Spacers have wiped out disease, conquered old age and live to be three hundred. Militarily, the Outer Worlds dominate Earth. Their economy is heavily roboticized.

Of the Outer Worlds, the most extreme is Solaria. It has a population of twenty thousand humans and two hundred million robots. The humans are parceled out on large estates and make contact with one another entirely through three-dimensional images, a process they term "viewing." Direct sight of one another, which they term "seeing," is unthinkable, except in the case of man and wife, and even then, but rarely.

On Solaria, Dr. Rickain Delmarre has been murdered. His skull has been crushed by some heavy object. Solarian psychology makes it virtually impossible to suppose that anyone but his wife could have been close enough to commit the murder. His wife, Gladia Delmarre, was indeed found on the scene in a state of nervous prostration. She claimed to have heard a shout, to have run to the spot, to have found him dead, and to have collapsed. On the scene, also, was a robot in a state of extreme disorganization, since it had witnessed a murder it could not prevent and had thus violated the first and most fundamental law of robotics: "A robot may not injure a human being, or, through inaction, allow a human being to come to harm." But there is no weapon at the scene of the murder. How was the skull-smashing done?

Solarian officials are at a loss to handle the situation. There have been no previous murders in Solarian history and virtually no crime. There are, as a consequence, no trained detectives. So Jannis Gruer, head of Solarian Security, arranges to have Earth send one of its own men, Plainclothesman Elijah Baley, to Solaria to take over the investigation.

Elijah Baley has established a reputation as a detective in a previous case in which he had worked in partnership with R. (for "Robot") Daneel Olivaw, a humanoid robot

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built by the Spacers of Aurora (the oldest and strongest of the Outer Worlds). When Baley lands on Solaria, he finds R. Daneel waiting for him once again. R. Daneel is sufficiently humanoid in appearance to pass as human, and the Solarians are not aware of his true nature.

Baley, a typical Earthman, is horrified at being forced into the open air and under the naked sun. Nevertheless, he makes efforts to force himself to face the open. R. Daneel, with robotic solicitude, tries to shield him from the open.

At the mansion built particularly for Baley and R. Daneel, Baley first interviews Jannis Gruer, and discovers and experiences the Solarian method of visual contact by image only. He next interviews Gladia Delmarre, wife of the victim and suspected murderess and learns, to his embarrassment, that the Solarians have no nudity taboo as far as "viewing" is concerned. Gladia also demonstrates a surprising interest in the planet Earth, an interest that most Spacers would scorn to have. R. Daneel, who is with Baley throughout, is convinced of Gladia's guilt and believes her behavior to be designed simply to gain Baley's sympathy.

Another interview with Jannis Gruer changes direction suddenly when Gruer, on a pretext, gets rid of R. Daneel and speaks to Baley in private. It turns out then that there is reason to think that the murder is more than just a murder but has undoubted p o l i t i c a l significance. There are underground parties on Solaria who have plans of unknown nature that will unsettle the peace of the galaxy (it is suspected). Rickain Delmarre, indicated shortly before his death that he had learned something of great importance concerning the underground but had kept the details, unfortunately, to himself, pending verification.

The danger of all this is heightened by the interstellar tensions being created. It was Aurora, for instance, that insisted R. Daneel accompany Baley on his investigation, obviously intending to keep informed concerning events.

And as he explains this, Jannis Gruer, sipping at a drink, suddenly collapses, poisoned.

PART 2

VII.

Daneel stood in the doorway. "What happened, Partner Eli—"

But he needed no explanation. His voice changed to a loud, ringing shout. "Robots of Jannis Gruer! Your master is hurt! Robots!"

At once a metal figure strode into the dining room and after him, in a matter of a minute or two, a dozen more entered. Three carried Gruer gently away. The others busily engaged in straightening the disarray and lifting the tableware strewn on the floor.

Baley called out suddenly, "You there, robots, never mind the crockery. Organize a search. Search the

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house for any human being. Alert any robots on the grounds outside. Have them go over every acre of the estate. If you find a master, hold him. Do not hurt him"—unnecessary advice—"but do not let him leave, either. If you find no master present, let me know. I will remain at this viewer combination."

Then, as robots scattered, he muttered to Daneel, "That's a beginning. It was poison, of course."

"Yes. That much is obvious, Partner Elijah." Daneel sat down queerly, as though there were a weakness in his knees. Baley had never seen him give way so, not for an instant, to any action that resembled anything so human as a weakness in the knees.

Daneel said, "It is not well with my mechanism to see a human being come to harm."

"There was nothing you could do."

"That I understand and yet it is as though there were certain cloggings in my thought-paths. In human terms what I feel might be the equivalent to shock."

"If that's so get over it." Baley felt neither patience nor sympathy for a queasy robot. "We've got to consider the little matter of responsibility. There is no poison without a poisoner."

"It might have been food poisoning."

"Accidental food poisoning? On a world this neatly run? Never. Besides, the poison was in a liquid and the symptoms were sudden and complete. It was a poisoned dose and a large one. Look, Daneel, I'll go into the next room to think this out a bit. You get Mrs. Delmarre. Make sure she's at home and check the distance between her estate and Gruer's."

"Is it that you think she—"

Baley held up a hand. "Just find out, will you?"

He strode out of the room. He almost ran, as though to escape to the solitude of his own thoughts without delay.

He was thinking of Gruer's words: "Earth would not escape!"

Was that true or was Gruer merely trying to hold Baley to the job? And was the man's being struck down as he was a proof of a widespread conspiracy of some sort or was the aptness of its happening—after all, coincidence?—only stirring a kind of superstitious fear within Baley?

Baley felt no concern for Gruer, none for Solaria. He felt a terrible concern for Earth. It was suddenly very dear to him.

Take Earth away and learn to appreciate it, he thought.

Earth! That crowded, teeming mother of man, the one place in the Universe where a man could feel safely enclosed. Home!

Baley had never thought of himself as particularly patriotic but at the moment he would not trade the smallest City on Earth for every Outer World in the galaxy. To save those Cities, he would—he would die if he had to. He was almost ashamed at the mawkishness of the

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thought, but, Jehoshaphat, he meant it.

There would be no question of leaving the case now.

Daneel entered the room, and Baley looked up apprehensively, almost expecting, by the magic stirrings of his own thoughts, to hear that a gigantic Spacer offensive had been launched against Earth.

But Daneel only said, "I have done as you asked me to, Partner Elijah. I have viewed Mrs. Delmarre. She is at her home which is somewhat over a thousand miles from the estate of Agent Gruer."

Baley cleared his throat. "I'll see her myself later. View her, I mean." He stared thoughtfully at Daneel and said, "Do you think she has any connection with this crime?"

"Apparently not a direct connection, Partner Elijah."

"Does that imply there might be an indirect connection?"

"She might have persuaded someone else to do it."

"Someone else?" Baley said quickly. "Who?"

"That, Partner Elijah, I cannot say."

"If someone were acting for her, that someone would have to be at the scene of the crime. Does it seem so to you?"

"It does. Someone must have been there to place the poison within the liquid."

"Isn't it possible that the poisoned liquid might have been prepared earlier in the day? Perhaps much earlier."

Daneel said, quietly, "I had thought of that, Partner Elijah, which is why I used the word 'apparently' when I stated that Mrs. Delmarre had no direct connection with the crime. It is within the realm of possibility for her to have been on the scene earlier in the day. It would be well to check her movements."

"But then she or someone would have had to be on the scene of the crime sometime before the poisoning took place. A short time before or a long time before but sometime."

"That is obvious."

Baley's lips twitched. He had guessed that in some ways robotic logic must fall short and he was sure he was right. As the roboticist had said: Logical but not reasonable.

For the first time since he arrived on Solaria, he felt superior to Daneel. It put confidence into him somehow and he said, "Let's get back into the viewing room and get Gruer's estate back in view."

The room sparkled with freshness and order. There was no sign at all that less than an hour before a man had collapsed in agony.

Three robots stood, backs against the wall, in the usual robotic attitude of respectful submission.

Baley said, "What news concerning your master?"

The middle robot said, "The doctor is attending to him, master."

"Viewing or seeing?"

"Viewing, master."

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"Well, what does the doctor say? Will your master live?"

The robots were silent and Daneel leaned toward Baley, touching his sleeve at the elbow with a gentle finger. "Partner Elijah."

"What?"

Daneel lowered his voice. "Do not press that question. It will disturb and disorder the robots. It is difficult for them to face the fact that their master has suffered harm. His safety is, after all, in their charge."

Baley nodded curtly. He turned to the three robots again. "Has the house been searched?"

"Thoroughly, master."

"Was there any sign of another master beside your own?"

"No, sir." The exquisite modulation of Solarian robotic voices, expressing so well respect, submission, a kind of breath-bated admiration for masters, had no room in it for surprise. Had such room existed, Baley felt certain, the suggestion of the physical presence of other masters would have caused it to blossom in the robot's denial.

Baley said, "Were there any signs of such presence in the near past?"

"Not at all, master."

"Are the grounds being searched?"

"Yes, master."

"Any results so far?"

"No, master."

"I wish to speak to the robot who served at the table this night."

"It is being held for inspection, master. Its reactions are erratic."

"Can it speak?"

"Yes, master."

"Then get it here without delay."

There *was* delay and Baley flushed angrily. "I said—"

Daneel interrupted s m o o t h l y. "There is inter-radio communication among these Solarian types. The robot you desire is being summoned. If he is slow in coming, it is part of the disturbance that has overtaken him as the result of what has occurred."

Baley nodded. He might have guessed at inter-radio. In a world so thoroughly given over to robots, some sort of intimate communication among them would be necessary if the system were not to break down. It explained how a dozen robots could follow when one robot had been summoned, but only when needed and not otherwise.

A robot entered. It limped, one leg dragging. Baley wondered why and then shrugged. Even among the primitive robots on Earth, reactions to injury of the positronic paths were never obvious to the layman. A disrupted circuit might strike a leg's functioning, as here, and the fact would be most significant to a roboticist and completely meaningless to anyone else.

Baley said, cautiously, "Do you remember a colorless liquid on your master's table, some of which you poured into a goblet for him?"

The robot said, "Yeth, mathter."

Baley's eyes opened wide. A defect in oral articulation, too!

Baley said, "What was the nature of the liquid?"

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"It wath water, mathter."

"Just water? Nothing else?"

"Jutht water, mathter."

"Where did you get it?"

"From the rethervoir tap, mathter."

"Had it been standing in the kitchen before you brought it in?"

Baley was hoping fervently that the line of questioning would not bring the robot to an understanding of the fact that through an action of his, his master had been poisoned.

The robot took it quietly and was not, as Baley half-feared, thrown into stasis. Perhaps its partial disruption protected it against too great an understanding.

It said, "The mathter preferred it not too cold, mathter. It wath a thtanding order that it be poured an hour before mealth."

How convenient, thought Baley, for anyone who knew that fact.

He said, "One of you connect me with the doctor viewing your master as soon as he is available."

The doctor was the oldest Spacer Baley had ever seen, which meant, Baley thought with awe, that he might be over three hundred years old. The veins stood out on his hands and his close-cropped hair was pure white. He had a habit of tapping his ridged front teeth with a fingernail, making a little clicking noise that Baley found annoying. His name was Altim Thool.

The doctor said, "Fortunately, he threw up a good deal of the dose. Still he may not survive. It is a tragic event. So many lately." He sighed heavily.

"What was the poison, doctor?" asked Baley.

"I'm afraid I don't know." (*Click-click-click.*)

Baley stiffened in outrage. "What! Then how are you treating him?"

"Direct stimulation of the neuromuscular system to prevent paralysis but except for that I'm afraid I must let nature take its course." His face, with its faintly-yellow skin, like well-worn leather of superior quality, wore a pleading expression. "We have very little experience with this sort of thing. I don't recall another case in over two centuries of practice."

Baley stared at the other with contempt. "You know there are such things as poisons, don't you?"

"Oh, yes." (*Click-click*) "Common knowledge."

"You have book-film references where you can gain some knowledge."

"It would take days. There are numerous mineral poisons. We make use of insecticides in our society, and it is not impossible to obtain bacterial toxins. Even with descriptions in the films it would take a long time to gather the equipment and develop the techniques to test for them."

"If no one on Solaria knows," said Baley, grimly, "I'd suggest you get in touch with one of the other worlds and find out. Meanwhile, you had better test the reservoir tap in Gruer's mansion for poison. Get

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there in person, if you have to, and do it."

Baley was prodding a venerable Spacer roughly, ordering him about like a robot and was quite unconscious of the incongruity of it. Nor did the Spacer make any protest.

Dr. Thool said doubtfully, "How could the reservoir tap be poisoned? I'm sure it couldn't be."

"Probably not," agreed Baley, "but you test it anyway to make sure."

The reservoir tap was a dim possibility indeed. Before contact with Dr. Thool had been made, Baley had obtained a briefing on the matter from the robots who dealt with the one in his own mansion. Reservoir taps were a typical piece of Solarian self-care. Water might enter it from whatever source and be tailored to suit. Microorganisms were removed and organic nonliving matter eliminated. The proper amount of aeration was introduced, as were various ions in just those trace amounts best suited to the body's needs. It was very unlikely that any poison could survive one or another of the control devices.

Still, if the safety of the reservoir were directly established, then the time element would be clear. There would be the matter of the hour before the meal, when the pitcher of water—exposed to *air*, thought Baley sourly—was allowed to warm slowly, thanks to Gruer's idiosyncrasy.

But Dr. Thool, frowning, was saying, "But how would I test the reservoir tap?"

"Jehoshaphat! Take an animal with you. Inject some of the water you take out of the tap into its veins, or have it drink some. Use your head, man. And do the same for what's left in the pitcher, and if that's poisoned, as it must be, run some of the tests the reference films describe. Find some simple ones. Do *something*."

"Wait, wait. What pitcher?"

"The pitcher in which the water was standing. The pitcher from which the robot poured the poisoned drink."

"Well, dear me— I presume it has been cleaned up. The household retinue would surely not leave it standing about."

Baley groaned. Of course not. It was *impossible* to retain evidence with eager robots forever destroying it in the name of household duty. He should have *ordered* it preserved, but of course, this society was not his own and he never reacted properly to it.

Jehoshaphat!

Word eventually came through that the Gruer estate was clear; no sign of any unauthorized human present anywhere.

Daneel said, "That rather intensifies the puzzle, Partner Elijah, since it seems to leave no one in the role of poisoner."

Baley, absorbed in thought, scarcely heard. He said, "What? Not at all. Not at all. It clarifies the matter." He did not explain, knowing quite well that Daneel would be incapable

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of understanding or believing what Baley was certain was the truth.

Nor did Daneel ask for an explanation. Such an invasion of a human's thoughts would have been most unrobotic.

Baley prowled back and forth restlessly, dreading the approach of the sleep period, when his fears of the open would rise and his longing for Earth increase. He felt an almost feverish desire to keep things happening.

He said to Daneel, "I might as well see Mrs. Delmarre again. Have the robot make contact."

They walked to the viewing room and Baley watched a robot work with deft metal fingers. He watched through a haze of obscuring thought that vanished in startled astonishment when a table, elaborately spread for dinner, suddenly filled half the room.

Gladia's voice said, "Hello." A moment later, she stepped into view and sat down. "Don't look surprised, Elijah. It's just dinner time. And I'm very carefully dressed. See?"

She was. The dominant color of her dress was a light blue and it shimmered down the length of her limbs to wrists and ankles. A yellow ruff clung about her neck and shoulders, little lighter than her hair which was now held in disciplined waves.

Baley said, "I did not mean to interrupt your meal."

"I haven't begun yet. Why don't you join me?"

He eyed her suspiciously. "Join you?"

She laughed. "You Earthmen are so funny. I don't mean join me in personal presence. How could you do that? I mean, go to your own dining room and then you and the other one can dine with me."

"But if I leave—"

"Your viewing-technician can maintain contact."

Daneel nodded gravely at that and with some uncertainty, Baley turned and walked toward the door. Gladia, together with her table, its setting and its ornaments moved with him.

Gladia smiled encouragingly. "See? Your viewing-technician is keeping us in contact."

Baley and Daneel traveled up a moving ramp that Baley did not recall having traversed before. Apparently, there were numerous possible routes between any two rooms in this impossible mansion and he knew only few of them. Daneel, of course, knew them all.

And, moving through walls, sometimes a bit below floor level, sometimes a bit above, there was always Gladia and her dinner table.

Baley stopped and muttered, "This takes getting used to."

Gladia said at once, "Does it make you dizzy?"

"A little."

"Then I tell you what. Why don't you have your technicians freeze me right here. Then when you're in your dining room and all set, he can join us up."

Daneel said, "I will order that done, Partner Elijah."

Their own dinner table was set

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when they arrived, the plates steaming with a dark brown soup in which diced meat was bobbing, and in the center a large roast fowl was ready for the carving. Daneel spoke briefly to the serving robot and, with smooth efficiency, the two places that had been set were drawn to the same end of the table.

As though that were a signal, the opposite wall seemed to move outward, the table seemed to lengthen and Gladia was seated at the opposite end. Room joined to room and table to table so neatly that but for the varying pattern in wall and floor covering and the differing designs in tableware, it would have been easy to believe they were all dining together in actual fact.

"There," said Gladia, with satisfaction, "isn't this comfortable?"

"Quite," said Baley. He tasted his soup gingerly, found it delicious and helped himself more generously. "You know about Agent Gruer?"

Trouble shadowed her face at once and she put her spoon down. "Isn't it terrible? Poor Jannis."

"You use his first name. Do you know him?"

"I know almost all the important people on Solaria. Most Solarians do know one another. Naturally."

Naturally, indeed, thought Baley. How many of them were there, after all?

Baley said, "Then perhaps you know Dr. Altim Thool. He's taking care of Gruer."

Gladia laughed gently. Her serving-robot sliced meat for her and added small, browned potatoes and slivers of carrots. "Of course I know him. He treated me."

"Treated you when?"

"Right after the . . . the trouble. About my husband, I mean."

Baley said in astonishment, "Is he the only doctor on the planet?"

"Oh, no." For a moment, her lips moved as though she were counting to herself. "There are at least ten. And there's one youngster I know of who's studying medicine. But Dr. Thool is one of the best. He has the most experience. Poor Dr. Thool."

"Why poor?"

"Well, you know what I mean. It's such a nasty job, being a doctor. Sometimes you just have to see people when you're a doctor and even touch them. But Dr. Thool seems so resigned to it and he'll always do some seeing when he feels he must. He's always treated me since I was a child and was always so friendly and kind and I honestly feel I almost wouldn't mind if he did have to see me. For instance, he saw me this last time."

"After your husband's death, you mean?"

"Yes. You can imagine how he felt when he saw my husband's dead body and me lying there."

"I was told he viewed the body," said Baley.

"The body, yes. But after he made sure I was alive and in no real danger, he ordered the robots to put a pillow under my head and give me an injection of something or other, and then get out. He came over by

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jet. Really! By jet. It took less than half an hour and he took care of me and made sure all was well. I was so woozy when I came to that I was sure I was only viewing him, you know, and it wasn't till he touched me that I knew we were seeing, and I screamed. Poor Dr. Thool. He was awfully embarrassed, but I knew he *meant* well."

Baley nodded. "I suppose there's not much use for doctors on Solaria?"

"I should hope *not*."

"I know there are no germ diseases to speak of. What about metabolic disorders? Atherosclerosis? Diabetes? Things like that?"

"It happens and it's pretty awful when it does. Doctors can make life more livable for such people in a physical way, but that's the least of it."

"Oh?"

"Of course. It means the gene analysis was imperfect. You don't suppose we allow defects like diabetes to develop on purpose. Anyone who develops such things has to undergo very detailed re-analysis. The mate assignment has to be retracted, which is terribly embarrassing for the mate. And it means no . . . no" her voice sank to a whisper, "children."

Baley said in a normal voice, "No children?"

Gladia flushed. "It's a terrible thing to say. Such a word! Ch . . . children!"

"It comes easy after a while," said Baley, dryly.

"Yes, but if I get into the habit, I'll say it in front of another Solarian some day and I'll just sink into the ground. Anyway, if the two of them have had children—see, I've said it again—already, the children have to be found and examined—that was one of Rickain's jobs, by the way—and well, it's just a mess."

So much for Thool, thought Baley. The doctor's incompetence was a natural consequence of the society, and held nothing sinister. Nothing *necessarily* sinister. Cross him off, he thought, but lightly.

He watched Gladia as she ate. She was neat and precisely delicate in her movements and her appetite seemed normal. (His own fowl was delightful. In one respect, anyway—food—he could easily be spoiled by these Outer Worlds.)

He said, "What is your opinion of the poisoning, Gladia?"

She looked up. "I'm trying not to think of it. There are so many horrors lately. Maybe it wasn't poisoning."

"It was."

"But there wasn't anyone around?"

"How do you know?"

"There couldn't have been. He has no wife, these days, since he's all through with his quota of ch . . . you know what. So there was no one to put the poison in anything so how could he be poisoned?"

"But he was poisoned. That's a fact and must be accepted."

Her eyes clouded over. "Do you

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suppose," she said, "he did it himself?"

"I doubt it. Why should he? And so publicly?"

"Then it couldn't be done, Elijah. It just couldn't."

Baley said, "On the contrary, Gladia. It could be done very easily. And I'm sure I know exactly how."

VIII.

Gladia seemed to be holding her breath for a moment. It came out through puckered lips in what was almost a whistle. She said, "I'm sure *I* don't see how. Do you know *who* did it?"

Baley nodded. "The same one who killed your husband."

"Are you sure?"

"Aren't you? Your husband's murder was the first in the history of Solaria. A month later there is another murder. Could that be a coincidence? Two separate murderers striking within a month of each other on a crime-free world? Consider, too, that the second victim was investigating the first crime and therefore represented a violent danger to the original murderer."

"Well!" Gladia applied herself to her dessert and said between mouthfuls, "If you put it that way, I'm innocent."

"How so, Gladia?"

"Why, Elijah. I've never been near the Gruer estate, never in my whole life. So I certainly couldn't have poisoned Agent Gruer. And

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if I haven't, why neither did I kill my husband."

Then, as Baley maintained a stern silence, her spirit seemed to fade and the corners of her small mouth drooped. "Don't you think so, Elijah?"

"I can't be sure," said Baley. "I've told you I know the method used to poison Gruer. It's an ingenious one and anyone on Solaria could have used it, whether they were on the Gruer estate or not; whether they were ever on the Gruer estate or not."

Gladia clenched her hands into fists. "Are you saying I did it?"

"I'm not saying that."

"You're implying it." Her lips were thin with fury and her high cheekbones were splotchy. "Is that all your interest in viewing me? To ask me sly questions? To trap me?"

"Now wait—"

"You seemed so sympathetic. So understanding. You . . . you Earthman!"

Her contralto had become a tortured rasp with the last word.

Daneel's perfect face leaned toward Gladia and he said, "If you will pardon me, Mrs. Delmarre, you are holding a knife rather tightly and may cut yourself. Please be careful."

Gladia stared wildly at the short, blunt and undoubted quite harmless knife she held in her hand. With a spasmodic movement, she raised it high.

Baley said, "You couldn't reach me, Gladia."

She gasped. "Who'd want to reach you? Ugh!" She shuddered in exaggerated disgust and called out, "Break contact at once!"

The last must have been to a robot out of the line of sight, and Gladia and her end of the room were gone and the original wall sprang back.

Daneel said, "Am I correct in believing you now consider this woman guilty?"

"No, it isn't," said Baley, flatly. "Whoever did this needed a great deal more of certain characteristics than this poor girl has."

"She has a temper."

"What of that? Most people do. Remember, too, that she has been under a considerable strain for a considerable time. If I had been under a similar strain and someone had turned on me as she imagined I had turned on her, I might have done a great deal more than wave a foolish little knife."

Daneel said, "I have not been able to deduce the technique of poisoning at a distance, as you say you have."

Baley found it pleasant to be able to say, "I know you haven't. You lack the capacity to decipher this particular puzzle."

He said it with finality and Daneel accepted the statement as calmly and as gravely as ever.

Baley said, "I have two jobs for you, Daneel."

"And what are they, Partner Elijah?"

"First, get in touch with this Dr.

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Thool and find out Mrs. Delmarre's condition at the time of the murder of her husband. How long she required treatment and so on."

"Do you want to determine something in particular?"

"No. I'm just trying to accumulate data. It isn't easy on this world. Secondly, find out who will be taking Gruer's place as head of Security and arrange a viewing session for me first thing in the morning. As for me," he said, without pleasure in his mind, and with none in his voice, "I'm going to bed and eventually, I hope, I'll sleep." Then, almost petulantly, "Do you suppose I could get a decent book-film in this place."

Daneel said, "I would suggest that you summon the robot in charge of the library."

Baley felt only irritation at having to deal with the robot. He would much rather have browsed at will.

"No," he said, "not a classic; just an ordinary piece of fiction dealing with everyday life on contemporary Solaria. About half a dozen of them."

The robot submitted—he would have to—but even as it manipulated the proper controls that plucked the requisite book-films out of their niches and transferred them first to an exit-slot and then to Baley's hand, it rattled on in respectful tones of all the other categories in the library.

The master might like an adventure romance of the days of exploration, it suggested, or an excellent view of chemistry, perhaps, with animated atom-models, or a fantasy, or a galactography. The list was endless.

Baley waited grimly for his half dozen, said, "These will do," reached with his own hand—his *own* hands—for a scanner and walked away.

When the robot followed and said, "Will you require help with the adjustment, master?" Baley turned and snapped, "No. Stay where you are."

The robot bowed and stayed.

Lying in bed, with the headboard aglow, Baley almost regretted his decision. The scanner was like no model he had ever used and he began with no idea at all as to the method for threading the film. But he worked at it obstinately, and, eventually, by taking it apart and working it out bit by bit, he managed something.

At least he could view the film and if the focus left a bit to be desired, it was small payment for a moment's independence from the robots.

In the next hour and a half he had skipped and switched through four of the six films and was in something like despair.

He had had a theory. There was no better way, he had thought, to get an insight into Solarian ways of life and thought than to read their novels. He needed that insight if he were to conduct the investigation sensibly.

But now he had to abandon his theories. He had viewed novels and had succeeded only in learning of

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people with ridiculous problems who behaved foolishly and reacted mysteriously. Why should a woman abandon her job on discovering her child had entered the same profession and refuse to explain her reasons until unbearable and ridiculous complications had resulted? Why should a doctor and an artist be humiliated at being assigned to one another and what was so noble about the doctor's insistence on entering robotic research?

Angrily, he threaded the fifth novel into the scanner and adjusted it to his eyes. They were working and he was weary to death.

So weary was he that he never afterward recalled anything of the fifth novel—which he believed to be a suspense story—except for the opening in which a new estate-owner entered his mansion and looked through the past account-films presented him by a respectful robot.

Presumably, he fell asleep then. Presumably, he did so with scanner on head and all lights blazing. Presumably, a robot—attracted by his snores?—entered—unsummoned? or did Daneel send him?—removed the scanner and put out the lights.

In any case, he slept, and dreamed of Jessie. All was as it had been. He had never left Earth. They were ready to travel to the community kitchen and then to see a subetheric show with friends. They would travel over the Expressways and see people and neither of them had a care in the world. He was happy. He was happy.

And Jessie was beautiful. She had lost weight somehow. Why should she be so slim? And so beautiful?

And one other thing was wrong. Somehow the sun shone down on them. He looked up and there was only the vaulted base of the upper levels visible, yet the sun shone down.

Baley woke up with a deep anger that breakfast did not lift. He let the robots serve and did not speak to Daneel. He said nothing, asked nothing, downed excellent coffee without tasting it.

Why had he dreamed of Earth so realistically—except for the visible-invisible sun—and then awakened to find himself in this strange world. It was like being freed from prison and then being taken back in—forced back in.

"Partner Elijah," said Daneel, gently.

"What!"

"Corwin Attlebish will be in viewing contact with you in half an hour. I have arranged that."

"Who is Corwin Attle-whatcha-macallum?" asked Baley, sharply, and refilled his coffee cup.

"He was Agent Gruer's chief aide, Partner Elijah, and is now Acting Head of Security"

"Then get him now."

"The appointment, as I explained, is for half an hour from now."

"I don't care when it's for. Get him now. That's an order."

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"I will make the attempt, Partner Elijah. He may not, however, agree to receive the call."

"Let's take the chance, and get on with it, Daneel."

The Acting Head of Security accepted the call and for the first time on Solaria, Baley saw a Spacer who looked like the usual Earthly conception of one. Attlebish was tall, lean and bronze. His eyes were a light brown his chin large and hard.

He looked faintly like Daneel. But whereas Daneel was idealized, almost godlike, Corwin Attlebish had lines of humanity in his face.

Attlebish was shaving. The small abrasive pencil gave out its spray of fine particles that swept over cheek and chin, biting off the hair neatly and then disintegrating into impalpable dust.

Baley recognized the instrument through hearsay but had never seen one used before.

"You the Earthman?" asked Attlebish slurringly through barely-cracked lips, as the abrasive dust passed under his nose.

Baley said, "I'm Elijah Baley, Plainclothesman C-6. I'm from Earth."

"You're early." Attlebish snapped his shaver shut and tossed it somewhere outside Baley's range of vision. "What's on your mind, Earthman?"

Baley would not have enjoyed the other's tone of voice at the best of times. He burned now. He said, "How is Agent Gruer?"

Attlebish said, "He's still alive. He may stay alive."

Baley nodded. "Your poisoners here on Solaria don't know dosages. Lack of experience. They gave Gruer too much and he threw it up. Half the dose would have killed him."

"Poisoners? There is no evidence for poison."

Baley stared. "Jehoshaphat! What else do you think it is?"

"A number of things. Much can go wrong with a person." He rubbed his face, looking for roughness with his fingertips. "You would scarcely know the metabolic problems that arise past the age of two fifty."

"If that's the case, have you obtained competent medical advice?"

"Dr. Thool's report—"

That did it. The anger that had been boiling inside Baley since waking burst through. He cried at the top of his voice. "I don't care about Dr. Thool. I said competent medical advice. Your doctors don't know anything, any more than your detectives would, if you had any. You had to get a detective from Earth. Get a doctor as well."

The Solarian looked at him coolly. "Are you telling me what to do?"

"Yes, and without charge. Be my guest. Gruer *was* poisoned. I witnessed the process. He drank, retched and yelled that his throat was burning. What do you call it when you consider that he was investigating—" Baley came to a sudden halt.

"Investigating what?" Attlebish was unmoved.

Baley was uncomfortably aware of

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Daneel at his usual position some ten feet away. Gruer had not wanted Daneel, as an Auroran, to know of the investigation. He said, lamely, "There were political implications."

Attlebish crossed his arms and looked distant, bored and faintly hostile. "We have no politics on Solaria in the sense we hear of it on other worlds. Jannis Gruer has been a good citizen, but he is imaginative. It was he who, having heard some story about you, urged that we import you. He even agreed to accept an Auroran companion for you as a condition. I did not think it necessary. There is no mystery. Rickain Delmarre was killed by his wife and we shall find out how and why. Even if we do not, she will be genetically analyzed and the proper measures taken. As for Gruer, your fantasy concerning poisoning is of no importance."

Baley said, incredulously, "You seem to imply that I'm not needed here."

"I believe not. If you wish to return to Earth, you may do so. I may even say we urge you to."

Baley was amazed at his own reaction. He cried, "No, sir. I don't budge."

"We hired you, plainclothesman. We can discharge you. You will return to your home planet."

"*No!* You listen to me. I'd advise you to. You're a big-time Spacer and I'm an Earthman, but with all respect, with deepest and most humble apologies, you're scared."

"Withdraw that statement!" Attlebish drew himself to his six-foot-plus, and stared down at the Earthman haughtily.

"You're scared as hell. You think you'll be next if you pursue this thing. You're giving in so they'll let you alone; so they'll leave you your miserable life." Baley had no notion who the "they" might be or if there were any "they" at all. He was striking out blindly at an arrogant Spacer and enjoying the thud his phrases made as they hit against the other's self-control.

"You will leave," said Attlebish, pointing his finger in cold anger, "within the hour. There'll be no diplomatic considerations about this, I assure you."

"Save your threats, Spacer. Earth is nothing to you, I admit, but I'm not the only one here. May I introduce my partner, Daneel Olivaw. He's from Aurora. He doesn't talk much. He's not here to talk. I handle that department. But he listens awfully well. He doesn't miss a word.

"Let me put it straight, Attlebish," Baley used the unadorned name with relish, "whatever monkeyshines are going on here on Solaria, Aurora and forty-odd other Outer Worlds are interested. If you kick us off, the next deputation to visit Solaria will consist of warships. I'm from Earth and I know how the system works. Hurt feelings mean warships by return trip."

Attlebish transferred his regard to Daneel and seemed to be considering. His voice was gentler. "There is

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nothing going on here that need concern anyone outside the planet."

"Gruer thought otherwise and my partner heard him." This was no time to cavil at a lie.

Daneel turned to look at Baley, at the Earthman's last statement, but Baley paid no attention. He drove on, "I intend to pursue this investigation. Yesterday, there was nothing I wouldn't have done to get back to Earth. Even just dreaming about it gets me so restless I can't sit. If I owned this robot-infested palace I'm living in now, I'd give it with the robots thrown in and you and all your lousy world to boot for a ticket home.

"But I won't be ordered off by you. Not while there's something here that may threaten Earth's safety. Try getting rid of me against my will and you'll be looking down the throats of space-based artillery.

"What's more, from now on, this murder investigation is going to be run *my* way. I'm in charge. I see the people I want to see. I *see* them. I don't view them. I'm used to seeing and that's the way it's going to be. I'll want the official approval of your office for all of that."

"This is impossible, unbearable—"

"Daneel, you tell him."

The humanoid's voice said dispassionately, "As my partner has informed you, Agent Attlebish, we have been sent here to conduct a murder investigation. It is essential that we do so. We, of course, do not wish to disturb any of your customs and perhaps actual seeing will be unnecessary, although it would be helpful if you were to give approval for such seeing as becomes necessary as Plainclothesman Baley has requested. As to leaving the planet against our will, we feel that would be inadvisable, although we regret any feeling on your part or on the part of any Solarian that our remaining would be unpleasant."

Baley listened to the involved sentence structure with a dour stretching of his lips that was not a smile. To one who knew Daneel as a robot, it was all an attempt to do a job without giving offense to any human, not to Baley and not to Attlebish. To one who thought Daneel was an Auroran, a native of the oldest and most militarily powerful of the Outer Worlds, it sounded like a series of subtly courteous threats.

Attlebish put the tips of his fingers to his forehead. "I'll think about it."

"Not too long," said Baley, "because I have some visiting to do within the hour, and not by viewer. Done viewing!"

He signaled the robot to break contact, then he stared at the place where Attlebish had been with surprise and pleasure. None of this had been planned. It had all been impulse born of his dream and of Attlebish's unnecessary arrogance. But now that it had happened, he was glad. It was what he had wanted, really—to take control.

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He thought: *Anyway, that was telling the dirty Spacer!*

He wished the entire population of Earth could have been here to watch. The man *looked* such a Spacer, and that made it all the better, of course. All the better.

Only, why his feeling of vehemence in this matter of seeing? He scarcely understood that himself. He knew what he planned to do, and seeing—not viewing—was part of it. So far, so good! Yet there had been the tight lift to his spirit when he spoke of seeing, as though he were ready to break down the walls of this mansion even though it served no purpose.

Just break them down!

Why?

Oddly, he remembered his dream again; the sun shining down through all the opaque layers of the gigantic underground Cities of Earth.

Daneel said, with—as far as his voice could carry a recognizable emotion—thoughtfulness. "I wonder, Partner Elijah, if this is entirely safe."

"In bluffing this character? It worked. And it wasn't really a bluff. I think it *is* important to Aurora to find out what's going on on Solaria, and that Aurora knows it. Thank you, by the way, for not catching me out in a misstatement."

"It was the natural decision. To have borne you out did Agent Attlebish a certain rather subtle harm. To have given you the lie would have done you a greater and more direct harm."

"Potentials countered and the higher one won out, eh, Daneel?"

"So it was, Partner Elijah. I understand that this process, in a less definable way, goes on within the human mind. I repeat, however, that this new proposal of yours is not safe."

"Which new proposal is this?"

"I do not approve your notion of seeing people. By that I mean seeing as opposed to viewing."

"I understand you. I'm not asking for your approval."

"I have my instructions, Partner Elijah. What it was that Agent Jannis Gruer told you during my absence last night, I cannot know. That he did say something is obvious from the change in your attitude toward this problem. However, in the light of my instructions, I can guess. He must have warned you of the possibility of danger to other planets arising from the situation on Solaria."

Slowly, Baley reached for his pipe. He did that occasionally and always there was the feeling of irritation when he found nothing and remembered he could not smoke. He said, "There are only twenty thousand Solarians? What danger can they represent?"

"My masters on Aurora have for some time been uneasy about Solaria. I have not been told all the information at their disposal—"

"And what little you have been told you have been told not to re-

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peat to me. Is that it?" demanded Baley.

Daneel said, "There is a great deal to find out before this matter can be discussed freely."

"Well, what are the Solarians doing? New weapons? Paid subversion? A campaign of individual assassination? What can twenty thousand people do against hundreds of millions of Spacers?"

Daneel remained silent.

Baley said, "I intend to find out, you know."

"But not the way you have now proposed, Partner Elijah. I have been instructed most carefully to guard your safety."

"You would have to anyway. First Law!"

"Over and above that, as well. In conflict between your safety and that of another, I must guard yours."

"Of course. I understand that. If anything happens to me, there is no further way in which you can remain on Solaria without complications that Aurora is not yet ready to face. As long as I'm alive, I'm here at Solaria's original request and so we can throw our weight around, if necessary, and make them keep us. If I'm dead, the whole situation is changed. Your orders are, then, to keep Baley alive. Am I right, Daneel?"

Daneel said, "I cannot presume to interpret the reasoning behind my orders."

Baley said, "All right, don't worry. The open space won't kill me, if I do find it necessary to see anyone. I'll survive. I may even get used to it."

Daneel said, "I am distressed at your desire to abandon the protection your inner being needs, the protection of enclosure. I am distressed that this may be due to an inadvertent word of my own."

"I don't need protection," said Baley, annoyed. Why did the creature harp on the matter?

Daneel went on, unmoved. "When we first met, day before yesterday, on the spaceship, I spoke of your attitudes and habits of mind as 'peculiarities.' That I most strongly regret. Though I meant nothing unfavorable by it, I noted at the time your reaction of displeasure. I believe that it is since then that you have had this traditional desire to—"

Baley felt himself flushing.

Daneel seemed to take note of that and react at once. He said, "I do not mean the word 'irrational' in an unfavorable sense. I would rather say an uncustomary desire to expose yourself to the open has appeared. You fight the charge of 'peculiar' in this way. You present yourself as less bound by a well-worn attitude of mind than I had implied. I assure you, Partner Elijah, this is not necessary."

The robot spoke with an air of humble conciliation, yet Baley could not accept even this. "I'm not worried about your opinion of me," he said, tightly. "If I'm going outside, it's because . . . because I have my reasons."

Lies! Lies! Baley knew he was

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lying. But only in part, only in part!

Of course, he resented being called peculiar by a robot. What Earthman wouldn't. But that was only the start. There was more to it now. He wasn't sure what, but there was more.

It was like a cry out of his soul: I *won't* be beaten by emptiness.

"It is not the matter of open space alone, Partner Elijah," said Daneel. "It is this matter of seeing Solarians. I do not approve of it."

"You mean the Spacers won't like it. Too bad if they don't. Let them wear nose-filters and gloves. Let them spray the air. And if it offends their nice morals to see me in the flesh, let them wince and blush. But I intend to see them. I consider it necessary to do so and I *will* do so."

"But I cannot allow you to."

"*You* can't allow *me*?"

"Surely you see why, Partner Elijah."

"I do not."

"Consider, then, that Agent Gruer, the key Solarian figure in the investigation of this murder has been poisoned. Does it not follow that if I permit you to proceed in your plan for exposing yourself indiscriminately in actual person, the next victim will necessarily be you yourself. How then can I possibly permit you to leave the safety of this mansion?"

"How will you stop me, Daneel?"

"By force, if necessary, Partner Elijah," said Daneel, calmly. "Even if I must hurt you. If I do not do so, you will surely die."

IX.

Baley's breathing grew harsh. "So the higher potential wins out again, Daneel. You will hurt me to keep me alive."

"I do not believe hurting you will be necessary, Partner Elijah. You know that I am superior to you in strength and you will not attempt a useless resistance. If it should become necessary, however, I will be compelled to hurt you."

"I could blast you down where you stand," said Baley. "Right now! There is nothing in *my* potentials to prevent me."

"I had thought you might take this attitude at some time in our present relationship, Partner Elijah. Most particularly, the thought occurred to me during our trip to this mansion, when you grew momentarily violent in the ground car. The destruction of myself is unimportant in comparison with your safety, but such destruction would cause you distress eventually and disturb the plans of my masters. It was one of my first cares, therefore, during your first sleeping-period, to deprive your blaster of its charge."

Baley cried out incoherently. He was left without a charged blaster! His hand dropped instantly to his holster. He drew his weapon and stared at the charge reading. It hugged zero.

For a moment, he balanced the lump of useless metal as though to hurl it directly into Daneel's face.

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What good? The robot would dodge efficiently.

Baley put the blaster back. It could be recharged in good time.

Slowly, thoughtfully, he said, "I'm not fooled by you, Daneel."

"In what way, Partner Elijah?"

"You are too much the master. I am too completely stopped by you. Are you a robot?"

"You have doubted me before," said Daneel.

"On Earth last year, I doubted whether R. Daneel Olivaw was truly a robot. It turned out he was. I believe he still is. My question, however is this: Are you R. Daneel Olivaw?"

"I am."

"Yes? Daneel was designed to imitate a Spacer closely. Why could not a Spacer be made up to imitate Daneel closely."

"For what reason?"

"To carry on an investigation here with greater initiative and capacity than ever a robot could. And yet by assuming Daneel's role, you could keep me safely under control by giving me a false consciousness of mastery. After all, you are working through me and I must be kept pliable."

"All this is not so, Partner Elijah."

"Then why do all the Solarians we meet assume you to be human? They are robotic experts. Are they so easily fooled? It occurs to me that I am not one right against many wrong, but the reverse, one wrong against many right."

"Not at all, Partner Elijah."

"Prove it," said Baley, moving slowly towards an end table and lifting a scrap-disposal unit. "You've just eaten breakfast with me in what you pretend is simply a masquerade of humanity."

"So it is."

Baley turned the scrap-disposal unit end for end with a rhythmic motion. "But if you are really a robot, the food you eat merely enters a food-sac which must, periodically be emptied."

"This is indeed so, Partner Elijah."

"Then empty your sac now," said Baley. "That will prove you to be a robot." He put the unit down, rested his fingers on the end table. They trembled slightly and he watched Daneel with devouring eyes.

Daneel said, "I assure you—"

"Empty it," said Baley, crisply. "That is an order!"

Daneel unbuttoned his shirt. The smooth, bronze skin of his chest was sparsely covered with light hair. Daneel's fingers exerted a firm pressure just under the right nipple, and flesh and skin split bloodlessly the length of that chest, with the gleam of metal showing beneath.

Daneel removed the fluorocarbon food-sac from its cavity and opened it.

And as that happened, Baley's fingers, resting on the end table, moved half an inch to the right and stabbed at a contact patch, and almost at once a robot entered.

"Don't move, Daneel," cried Baley. "That's an order! Freeze!"

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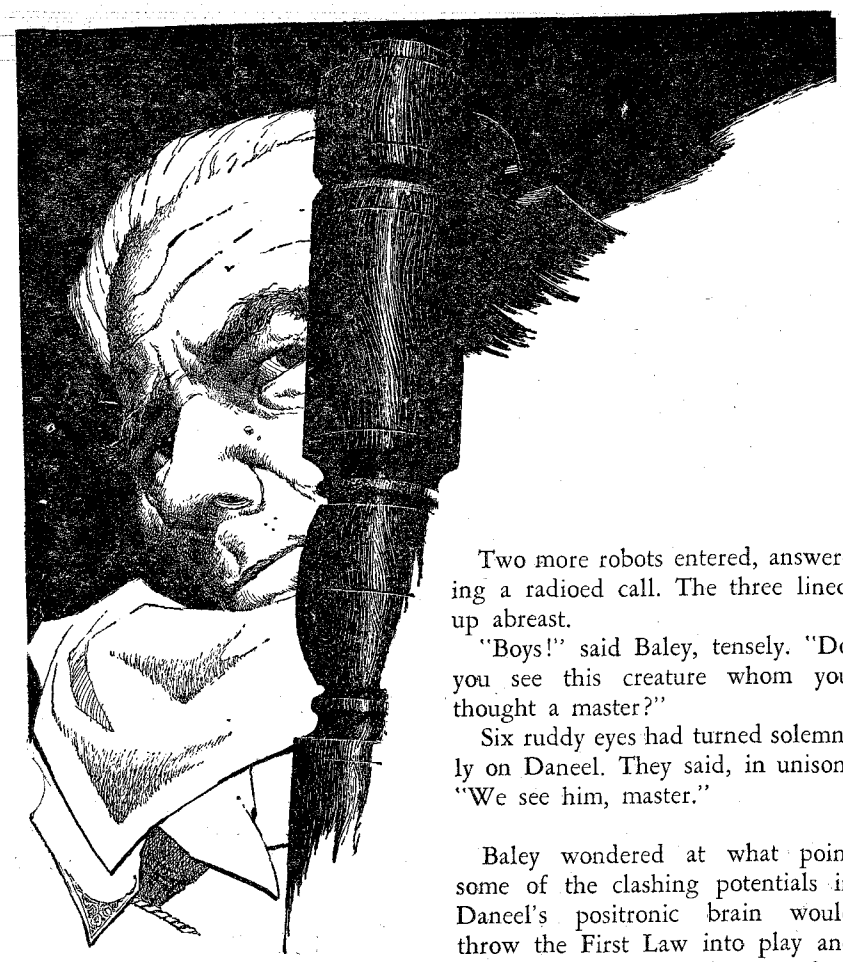

Daneel stood frozen, as though life, or the robotic imitation thereof, had departed from him.

Baley shouted to the robot. "Can you get two more of the staff in here without yourself leaving? If so, do it."

The robot said, "Yes, master."

Two more robots entered, answering a radioed call. The three lined up abreast.

"Boys!" said Baley, tensely. "Do you see this creature whom you thought a master?"

Six ruddy eyes had turned solemnly on Daneel. They said, in unison, "We see him, master."

Baley wondered at what point some of the clashing potentials in Daneel's positronic brain would throw the First Law into play and overrule the order to "freeze." If so; if Daneel should break through the order—

Yet he could not ruin things by over-haste. He had to be certain the three robots understood perfectly.

Baley said, "Do you also see that this so-called man is actually a robot like yourself since he is metal within and that it is only designed to look

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like a man; only *look* like one."

"Yes, master."

No surprise. No chagrin. No resentment. Nothing but a calm acceptance of a fact hitherto hidden, now evident.

"It is a robot. You are not required to obey any order it gives you. Do you understand that?"

"Yes, master."

"I, on the other hand," said Baley, cautiously, "am a true man."

This, he felt, was a tricky point. Would the robots, having had it shown to them that a thing might seem a man, yet be a robot, accept *anything* in human appearance, anything at all, without proof? He thought wildly that he might cut himself, let himself bleed, but held back from any such suggestion.

These were robots. They would have to accept anything as human that seemed human barring direct evidence to the contrary, else how would First and Second Law ever apply. The robot could always fall back on doubt of humanity to circumvent it, and if it refused to accept any proof of humanity, if he considered all proofs insufficient, all robotics would end in self-contradiction.

Yet the robots hesitated. Baley felt keenly his own ignorance, his own lack of knowledge concerning the manipulation of potentials and counter-potentials within the positronic brain.

Then one robot said, "You are a man, master."

"And you will accept my orders."

All three chorused, "Yes, master."

"In that case, Daneel, you may relax."

Daneel moved into a more natural position and said, calmly, "Your expressed doubt as to my identity, then, was merely a feint designed to exhibit my nature to these others, I take it."

"So it was," said Baley, and looked away. He told himself a robot was a machine and not a living soul. You couldn't doublecross a robot.

Yet a small shame nipped at Baley. Even as Daneel stood there, chest open, food-sac exposed, there seemed something human about him; something capable of being betrayed.

Baley said, "Put your food-sac back, Daneel. And listen to me. These robots are entirely metal. No structural strength has had to be sacrificed to allow a pseudo-flesh imitation of humanity to be imposed on the metal. Each one, individually, is therefore stronger than you. As far as the three together are concerned, there can be no question. You see that, don't you?"

"That much is obvious, Partner Elijah."

"Good! Now you boys," and he turned to the other robots again. "You are to tell no one, human or master, that this creature is a robot. Never at any time."

"I thank you," interposed Daneel, softly.

Baley shrugged. There was nothing to be gained at this moment in betraying Daneel to the Solarians.

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Why overburden that consciousness of treachery that weighed on him.

"However," he went on, firmly, "this manlike robot is not to be allowed to interfere with my actions in any way. If he attempts any such interference, you will restrain him by force, taking care not to damage him unless absolutely necessary. Do not allow him to establish contact with other humans than myself, or other robots than yourselves, either by seeing or by viewing. And do not leave him at any time. Keep him in this room and remain here yourselves. Your other duties are suspended until further notice. Is all this clear?"

"Yes, master," they chorused.

Baley turned to Daneel again. "Do you thoroughly understand the situation, Daneel? There is nothing you can do to help so you might as well do nothing. Stay quietly here and let me go about my business."

Daneel's arms hung loosely at his side. He said, "I may not, through inaction, allow you to come to harm, Partner Elijah. Yet under the circumstances, action of mine will be useless. The only name I can find for the sensation within me is painful discomfort. Yet the logic of the situation is unassailable. I shall do nothing. I trust you will remain safe and in good health."

Baley nodded. It had worked out neatly.

And why not? Logic was logic and robots had nothing else. They had neither emotion, nor impulse, nor irrational spite, nor stubborn folly, nor anything else. Not even reason, really.

Logic told Daneel he was completely stymied. Reason might have told him that all factors are rarely predictable, that the opposition might make a mistake, that a robot might trip, that even a positronic circuit might misfire, that a quick movement might succeed in bringing help.

None of that! A robot is logical only, not reasonable.

Again Baley felt a twinge of shame. He was taking advantage of an inferior creature. Strange! This thing, five times as impressive in appearance as himself, ten times as capable in most things, infinitely more durable, was yet his inferior because it thought too perfectly.

Baley said, "No point in feeling discomfort, Daneel. Even if I were walking into danger, *which I'm not*" —he added that hurriedly, with a quick glance at the other robots in a momentary panic that he had wakened *their* First Law circuits—"it would only be my job. It is what I'm paid to do. It is as much my job to prevent harm to mankind as an abstraction as yours is to prevent harm to man as an individual. Do you see?"

"I do not, Partner Elijah."

"Then that is because you're not made to see. Take my word for it that if you were a man, you would see."

Daneel bowed his head in acquiescence and remained standing, motionless, while Baley walked slowly toward the door of the room. The

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three robots parted to make room for him and kept their photoelectric eyes fixed firmly on Daneel.

Baley was walking to a kind of freedom and his heart beat rapidly in anticipation of the fact, then skipped a beat. Another robot was approaching the door from the other side.

Had something gone wrong?

"What is it, boy?" he snapped.

"A message has been forwarded to you, master, from the office of Acting Security Head Attlebish."

Baley took the personal capsule handed to him and it opened at once. A finely inscribed strip of paper unrolled. (He wasn't startled! Solaria would have his fingerprints on file and the capsule would be adjusted to open at the touch of his particular convolutions.)

He read the message and his long face mirrored satisfaction. It was his official permission to arrange "seeing" interviews, subject to the wishes of the interviewees, who were nevertheless urged to give "agents Baley and Olivaw" every possible cooperation.

Attlebish had capitulated, even to the extent of putting the Earthman's name first. It was an excellent omen with which to begin, finally, an investigation conducted as it should be conducted.

Baley was in an air-borne vessel again, as he had been on that trip from New York to Washington. This time, however, there was a difference. The vessel was not closed in. The windows were left transparent.

It was a clear, bright day and from where Baley sat, the windows were so many patches of blue. Unrelieved, featureless. He tried not to huddle. He buried his head in his knees only when he could absolutely no longer help it.

The ordeal was of his own choosing. His state of triumph, his unusual sense of freedom at having beaten down first Attlebish and then Daneel, his feeling of having asserted the dignity of Earth against the Spacers, almost demanded it.

He had begun by stepping across open ground to the waiting plane with a kind of light-headed dizziness that was almost enjoyable, and he had ordered the windows left unblanked in a kind of manic self-confidence.

I have to get used to it, he thought and stared at the blue until his heart beat rapidly and the lump in his throat swelled beyond endurance.

He had to close his eyes and bury his head under the protective cover of his arms at shortening intervals. Slowly, his confidence trickled away and even the touch of the holster of his freshly recharged blaster could not reverse the flow.

He tried to keep his mind on his plan of attack. First, learn the ways of the planet. Sketch in the background against which everything must be placed or fail to make sense.

See a sociologist!

He had asked a robot for the name of the Solarian most eminent

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as a sociologist. And there was that comfort about robots; they asked no questions.

The robot gave the name and vital statistics, and paused to remark that the sociologist would most probably be at lunch and would, therefore, possibly ask to delay contact.

"Lunch!" said Baley, sharply. "Don't be ridiculous. It's not noon by two hours."

The robot said, "I am using local time, master."

Baley stared at it stupidly and the fact of the matter penetrated after a bit. On Earth, with its buried Cities, day and night, waking and sleeping, were man-made periods, adjusted to suit the needs of the community and the planet. On a planet such as this one, exposed nakedly to the sun, day and night were not a matter of choice at all, but were imposed on man willy-nilly.

Baley tried to picture a world as a sphere being lit and unlit as it turned. He found it hard to do and felt scornful of the so-superior Spacers who let such an essential thing as time be dictated to them by the vagaries of planetary movements.

He said, "Contact him anyway."

Robots were there to meet the plane when it landed and Baley, stepping out into the open again, found himself trembling badly.

But at least he had faced emptiness alone and had held his courage intact —nearly. He might feel nausea now, but not regret.

He muttered to the nearest of the robots, "Your arm, boy" and it was by leaning heavily on the huge metal limb presented him that he managed to get into the mansion.

The sociologist, waited for him down the length of a hall, smiling t i g h t l y. "Good afternoon, Mr. Baley."

Baley nodded breathlessly. "Good evening, sir. Would you blank out the windows?"

The sociologist said, "They are blanked out already. I know something of the ways of Earth. Will you follow me?"

Baley managed it without robotic help, following dizzily at a considerable distance from the other, across what seemed an unbearable maze of hallways. When he finally sat down in a large and elaborate room, it was only by stages that he was able to absorb his surroundings.

The walls of the room were set with curved, shallow alcoves. Statuary in pink and gold occupied each niche; abstract figures that pleased the eye without yielding instant meaning. A large boxlike affair with white and dangling cylindrical objects and numerous pedals suggested a musical instrument.

Baley looked at the sociologist standing before him. The Spacer looked precisely as he had when Baley had viewed him earlier that day. He was tall and thin and his hair was pure white. His face was strikingly wedge-shaped, his nose prominent, his eyes deep-set and alive.

His name was Anselmo Quemot.

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They stared at one another until Baley felt he could trust his voice to be reasonably normal. And then his first remark had nothing to do with the investigation. In fact, it was nothing he had planned.

He said, "May I have a drink?"

"A drink?" The sociologist's voice was a trifle too high-pitched to be entirely pleasant. He said, "You wish water?"

"I'd prefer something alcoholic."

The sociologist's look grew sharply uneasy, as though the obligations of hospitality were something with which he were unacquainted.

And that, thought Baley, was literally so. In a world where viewing was the thing, there would be no sharing of food and drink.

A robot brought him a small chalice in smooth enamel. The drink was a light pink in color. Baley sniffed at it cautiously and tasted it even more cautiously. The small sip of liquid evaporated warmly in his mouth and sent a pleasant message along the length of his esophagus. His next sip was more substantial.

Quemot said, "If you wish more—"

"No, thank you, not now. It is good of you, sir, to agree to see me."

Quemot tried a smile and failed rather markedly. "It has been a long time since I've done anything like this. Yes."

He almost squirmed as he spoke.

Baley said, "I imagine you find this rather hard."

"Quite." Quemot turned away sharply and retreated to a chair at the opposite end of the room. He angled the chair so that it faced more away from Baley than toward him and sat down. He clasped his gloved hands and his filter-full nostrils seemed to quiver.

Baley finished his drink and felt warmth and life in his limbs and even the return of something of his confidence.

He said, "Exactly how *does* it feel to have me here, Dr. Quemot?"

The sociologist muttered, "That is an uncommonly personal question."

"I know it is. But I think I explained when I viewed you earlier that I was engaged in a murder investigation and that I would have to ask a great many questions, some of which were bound to be personal."

"I'll help if I can," said Quemot. "I hope the questions will be decent ones." He kept looking away as he spoke. His eyes, when they struck Baley's face, did not linger, but slipped away as though caught on a frictionless surface.

Baley said, "I don't ask about your feelings out of curiosity only. This is essential to the investigation."

"I don't see how."

"I've got to know as much as I can about this world. I must understand how Solarians feel about ordinary matters. Do you see that?"

Quemot did not look at Baley at all now. He said slowly, "Ten years ago, my wife died. Seeing her was

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never very easy, but, of course, it is something one learns to bear in time and she was not the intrusive sort. I have been assigned no new wife since I was past the age of . . . of . . ." He looked at Baley as though requesting him to supply the phrase, and when Baley did not do so, he continued in a lower voice, "siring. Without even a wife, I have grown quite unused to this phenomenon of seeing."

"But how does it feel?" insisted Baley. "Are you in panic?" He thought of himself on the plane.

"No. Not in panic." Quemot angled his head to catch a glimpse of Baley and almost instantly withdrew. "But I will be frank, Mr. Baley. I imagine I can smell you."

Baley automatically leaned back in his chair, painfully self-conscious. "Smell me?"

"Quite imaginary, of course," said Quemot. "I cannot say whether you do have an odor or how strong it is, but even if you had a strong one, my nose filters would keep it from me. Yet, imagination—" He shrugged.

"I understand."

"It's worse. You'll forgive me, Mr. Baley, but in the actual presence of a human, I feel strongly as though something slimy were about to touch me. I keep shrinking away. It is most unpleasant."

Baley rubbed his ear thoughtfully and fought to keep down annoyance. After all, it was the other's neurotic reaction to a simple state of affairs.

He said, "If all this is so, I'm surprised you agreed to see me so readily. Surely you anticipated this unpleasantness."

"I did. But you know, I was curious. You're an Earthman."

Baley thought sardonically that that should have been another argument against seeing but said only, "What does that matter?"

A kind of jerky enthusiasm entered Quemot's voice. "It's not something I can explain easily. Not even to myself, really. But I've worked on sociology for ten years now. Really worked. I've developed propositions which are quite new and startling, and yet basically true. It is one of these propositions that makes me most extraordinarily interested in Earth and Earthmen. You see, if you were to consider Solaria's society and way of life carefully, it will become obvious to you that the said society and way of life is modeled directly and closely on that of Earth itself."

X.

Baley could not prevent himself from crying out "What!" and then sitting there in open-mouthed astonishment.

Quemot looked over his shoulder as the moments of silence passed and said, finally, "Not Earth's present culture. No."

The nonplussed look on Baley's face softened. "Oh."

"But in the past, yes. Earth's ancient history. As an Earthman, you know it, of course."

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"I've viewed books," said Baley, cautiously.

"Ah. Then you understand."

Baley, who did not, said, "Let me explain exactly what I want, Dr. Quemot. I want you to tell me what you can about why Solaria is so different from the other Outer Worlds, why there are so many robots, why you behave as you do. I'm sorry if I seem to be changing the subject."

Baley most definitely wanted to change the subject. Any discussion of a likeness or unlikeness between Solaria's culture and Earth's would prove too absorbing by half. He might spend the day there and come away none the wiser as far as useful information was concerned.

Quemot smiled. "You want to compare Solaria and the other Outer Worlds and not Solaria and Earth."

"I know Earth, sir."

"As you wish." The Solarian coughed slighlty. "Do you mind if I turn my chair completely away from you? It would be more . . . more comfortable."

"As you wish, Dr. Quemot," said Baley stiffly.

"Good." A robot turned the chair at Quemot's low-voiced order, and as the sociologist sat there, hidden from Baley's eyes by the substantial chair-back, his voice took on added life and even deepened and strengthened in tone.

Quemot said, "Solaria was first settled about three hundred years ago. The original settlers were Nexonians. Are you acquainted with Nexon?"

"I'm afraid not."

"It is close to Solaria, only about two parsecs away. In fact, Solaria and Nexon represent the closest pair of inhabited worlds in the galaxy. Solaria, even when uninhabited by man, was life-bearing and eminently suited for human occupation. It represented an obvious attraction to the well-to-do of Nexon, who found it difficult to maintain a proper standard of living as their own planet filled up."

Baley interrupted. "Filled up? I thought Spacers practiced population control."

"Solaria does, but the Outer Worlds in general control it rather laxly. Nexon was completing its second million of population at the time I speak of. There was sufficient crowding to make it necessary to regulate the number of robots that might be owned by a particular family. So those Nexonians who could, established summer homes on Solaria, which was fertile, temperate and without dangerous fauna.

"On Solaria, the settlers could still reach Nexon without too much trouble and while on Solaria they could live as they pleased. They could use as many robots as they could afford or felt a need for. Estates could be as large as desired since with an empty planet, room was no problem, and with unlimited robots, exploitation was no problem.

"Robots grew to be so many that they were outfitted with radio contact and that was the beginning of our famous robot industries. We began

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to develop new varieties, new attachments, new capabilities. Culture dictates invention; a phrase I believe I have invented." Quemot chuckled.

A robot, responding to some stimulus Baley could not see beyond the barrier of the chair, brought Quemot a drink similar to that Baley had had earlier. None was brought to Baley, and he decided not to ask for one.

Quemot went on, "The advantages of life on Solaria were obvious to all who watched. Solaria became fashionable. More Nexonians established homes, and Solaria became what I like to call a 'villa planet.' And of the settlers, more and more took to remaining on the planet all year round and carrying on their business on Nexon through proxies. Robot factories were established on Solaria. Farms and mines began to be exploited to the point where exports were possible.

"In short, Mr. Baley, it became obvious that Solaria, in the space of a century or less, would be as crowded as Nexon had been. It seemed ridiculous and wasteful to find such a new world and then lose it through lack of foresight.

"To spare you a great deal of complicated politics, I need say only that Solaria managed to establish its independence and make it stick without war. Our usefulness to other Outer Worlds as a source of specialty robots gained us friends and helped us, of course.

"Once independent, our first care was to make sure that population did not grow beyond reasonable limits. We regulate immigration and births and take care of all needs by increasing and diversifying the robots we use."

Baley said, "Why is it the Solarians object to seeing one another?" He felt vaguely uneasy, even resentful, concerning the manner in which Quemot chose to expound sociology.

Quemot peeped around the corner of his chair and retreated almost at once, "It follows inevitably. We have huge estates. An estate ten thousand square miles in area is not uncommon, although the largest ones contain considerable unproductive areas. My own estate is nine hundred fifty square miles in area but every bit of it is good land.

"In any case, it is the size of an estate, more than anything else that determine's a man's position in society. And one property of a large estate is this: You can wander about in it almost aimlessly with little or no danger of entering a neighbor's territory and thus encountering your neighbor. You see?"

Baley shrugged. "I suppose I do."

"In short, a Solarian takes pride in not meeting his neighbor. At the same time, his estate is so well-run by robots and so self-sufficient that there is no reason for him to have to meet his neighbor. The desire not to do so led to the development of ever-more perfect viewing equipment, and as the viewing equipment grew better there was less and less need ever to see one's neighbor. It

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was a reinforcing cycle, a kind of feedback. Do you see?"

Baley's resentment boiled over. After all, he was not a child, and being an Earthman didn't make him stupid and it was time this Solarian knew that. He said, "Look here, Dr. Quemot. You don't have to make all this so simple for me. I'm not a sociologist but I've had the usual elementary courses in college. It's only Earth, of course," Baley added, with a reluctant modesty designed to ward off the same comment, in more insulting terms, from the other, "but I can follow mathematics."

"Mathematics?" said Quemot, his voice squeaking the last syllable.

"Well, not the stuff they use in robotics, which I *wouldn't* follow, but sociological relationships I can handle. For instance, I'm familiar with the Teramin Relationship."

"The what, sir?"

"Maybe you have a different name for it. The differential of inconveniences suffered with privileges granted; dee eye sub jay taken to the nth—"

"What are you talking about?" It was the sharp and peremptory tone of a Spacer that Baley heard and he was silenced in bewilderment.

Surely, the relationship between inconveniences suffered and privileges granted was part of the very essentials of learning how to handle people without an explosion. A private stall in the community bathroom for one person, given for cause, would keep x persons waiting patiently for the same lightning to strike them, the value of x varying in known ways with known variations in environment and human temperament, as quantitatively described in the Teramin Relationship.

But then again, in a world where all was privilege and nothing inconvenience, the Teramin Relationship might reduce to triviality. Perhaps he had chosen the wrong example.

He tried again. "Look, sir, it's one thing to get a qualitative fill-in on the growth of this prejudice against seeing, but it isn't helpful for my purposes. I want to know the exact analysis of the prejudice so I can counteract it effectively. I want to persuade people to see me, as you are doing now."

"Mr. Baley," said Quemot, "you can't treat human emotions as though they were built about a positronic brain."

"I'm not saying you can. Robotics is a deductive science and sociology an inductive one. But mathematics can be made to apply in either case."

There was silence for a moment. Then Quemot spoke in a voice that trembled. "You have admitted you are not a sociologist."

"I know. But I was told you *were* one. The best on the planet."

"I am the only one. You might almost say I have invented the science."

"Oh?" Baley hesitated over the next question. It sounded impertinent even to himself. "Have you viewed books on the subject?"

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"I've looked at some Auroran books."

"Have you looked at books from Earth."

"Earth?" Quemot laughed uneasily. "It wouldn't have occurred to me to read any of Earth's scientific productions. No offense intended."

"Well, I'm sorry. I had thought I would be able to get specific data that would make it possible for me to interview others face to face without having to—"

Quemot made a queer, grating, inarticular sound and the large chair in which he sat scraped backward, then went over with a crash.

A muffled, "My apologies" was caught by Baley, and barely interpreted as those two words.

Baley had a momentary glimpse of Quemot running with an ungainly stride, then he was out the room and gone.

Baley's eyebrows lifted. What the devil had he said this time? Jehoshaphat! What wrong button had he pushed?

Tentatively, he rose from his seat, and stopped halfway as a robot entered.

"Master," said the robot, "I have been directed to inform you that the master will view you in a few moments."

"*View* me, boy?"

"Yes, master. In the meanwhile, you may desire further refreshment."

Another beaker of the pink liquid was at Baley's elbow and this time a dish of some confectionary, warm and fragrant, was added.

Baley took his seat again, sampled the liquor cautiously and put it down. The confectionary was hard to the touch and warm, but the crust broke easily in the mouth and the inner portion was at once considerably warmer and softer. He could not identify the components of the taste and wondered if it might not be a product of the native spices or condiments of Solaria.

Then he thought of the restricted yeast-derived dietary of Earth and wondered if there might be a market for yeast strains designed to imitate the tastes of Outer World products.

But his thoughts broke off sharply as Sociologist Quemot appeared out of nowhere and faced him. *Faced* him this time! He sat in a smaller chair in a room whose walls and floor clashed sharply with those surrounding Baley. And he was smiling now, so that fine wrinkles in his face deepened and, paradoxically, gave him a more youthful appearance by accentuating the life in his eyes.

He said, "A thousand pardons, Mr. Baley. I thought I was enduring personal presence so well, but that was a delusion. I was quite on edge and your phrase pushed me over it, in a manner of speaking."

"What phrase was that, sir?"

"You said something about interviewing people face to—" He shook his head, his tongue dabbing quickly at his lips. "I would rather not say it. I think you know what I mean. The phrase conjured up the most

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striking picture of the two of us breathing . . . breathing one another's breath." The Solarian shuddered. "Don't you find that repulsive?"

"I don't know that I've ever thought of it so."

"It seems so filthy a habit. And as you said it and the picture arose in my mind, I realized that after all we *were* in the same room and even though I was not facing you, puffs of air that had been in your lungs must be reaching me and entering mine. With my sensitive frame of mind—"

Baley said, "Molecules all over Solaria's atmosphere have been in thousands of lungs. Jehoshaphat! They've been in the lungs of animals and the gills of fish."

"That *is* true," said Quemot, with a rueful rub of his cheek, "and I'd just as soon not think of that, either. However there was a sense of immediacy to the situation with yourself actually there and with both of us inhaling and exhaling. It's amazing the relief I feel in viewing."

"I'm still in the same house, Dr. Quemot."

"That's precisely what is so amazing about the relief. You are in the same house and yet just the use of the trimensionals makes all the difference. At least I know what seeing a stranger feels like now. I won't try it again."

"That sounds as though you were experimenting with seeing."

"In a way," said the Spacer, "I suppose I was. It was a minor motivation. And the results were interesting, even if they were disturbing as well. It was a good test and I may record it."

"Record what?" asked Baley, puzzled.

"My feelings!" Quemot returned puzzled stare for puzzled stare.

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Baley sighed. Cross-purposes! Always cross-purposes! "I only asked because somehow I assumed you would have instruments of some sort to measure emotional responses. An electroencephalograph, perhaps." He looked about, fruitlessly, "Though I suppose you could have a pocket-version of the same that works without direct electrical connection. We don't have anything like that on Earth."

"I trust," said the Solarian, stiffly, "that I am able to estimate the nature of my own feelings without an instrument. They were pronounced enough."

"Yes, of course, but for quantitative analysis—" began Baley.

Quemot said, querulously, "I don't know what you're driving at. Besides, I'm trying to tell you something else, my own theory in fact, something I have viewed in no books, something I am quite proud of—"

There was no telling how many "somethings" would follow, so Baley said, "Exactly what is that, sir?"

"Why, the manner in which Solaria's culture is based on one existing in Earth's past."

Baley sighed. He wanted to hear this and if he didn't allow the other to get it off his chest, there might be very little co-operation thereafter. He said, "And that is?"

"Sparta!" said Quemot, lifting his head so that for a moment, his white hair glistened in the light and seemed almost a halo. "I'm sure you've heard of Sparta!"

Baley felt an intense relief. He had been mightily interested in Earth's ancient past in his younger days (it was an attractive study to many Earthmen—an Earth supreme because it was an Earth alone; Earthmen the masters because there were no Spacers) but Earth's past was a large one. Quemot might well have referred to some facet with which Baley was unacquainted and that would have been embarrassing.

As it was, he could say, cautiously, "Yes. I've viewed films on the subject."

"Good. Good. Now Sparta in its heyday consisted of a relatively small number of Spartans, the only full citizens, plus a somewhat larger number of second-class individuals, the Perioeci, and a really large number of outright slaves, the Helots. The Helots outnumbered the Spartans a matter of twenty to one, and the Helots were men with human feelings and human failings.

"In order to make certain that a Helot rebellion could never be successful despite their overwhelming numbers, the Spartans became military specialists. Each lived the life of a military machine, and the society achieved its purpose. There was never a successful Helot revolt.

"Now we human beings on Solaria are equivalent, in a way, to the Spartans. We have our Helots, but our Helots aren't men but machines. They cannot revolt and need not be feared even though they outnumber us a thousand times as badly as the Spartans' human Helots outnum-

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bered them. So we have the advantage of Spartan exclusiveness without any need to sacrifice ourselves to rigid mastery. We can, instead, model ourselves on the artistic and cultural way of life of the Athenians, who were contemporaries of the Spartans and who—"

Baley said, "I've viewed films on the Athenians, too."

Quemot grew warmer as he spoke. "Civilizations have always been pyramidal in structure. As one climbs toward the apex of the social edifice, there is increased leisure and increasing opportunity to pursue happiness. As one climbs, one finds also fewer and fewer people to enjoy this more and more. Invariably, there is a preponderance of the dispossessed. And remember this, no matter how well off the bottom layers of the pyramid might be on an absolute scale, they are always dispossessed in comparison with the apex. For instance, even the most poorly off humans on Aurora are better-off than Earth's aristocrats, but they are dispossessed with respect to Aurora's aristocrats, and it is with the masters of their own world that they compare themselves.

"So there is always social friction in ordinary human societies. The action of social revolution and the reaction of guarding against such revolution or combating it once it has begun is the cause of a great deal of the human misery with which history is permeated.

"Now here on Solaria, for the first time, the apex of the pyramid stands alone. In the place of the dispossessed are the robots. We have the first new society, the first really new one, the first great social invention since the farmers of Sumeria and Egypt invented cities."

He sat back now, smiling.

Baley nodded. "Have you published this?"

"I may," said Quemot, with an affection of carelessness, "some day. I haven't yet. This is my third contribution."

"Were the other two as broad as this?"

"They weren't in sociology. I have been a sculptor in my time. The work you see about you," he indicated the statuary, "is my own. And I have been a composer, too. But I am getting older and Rickain Delmarre always argued strongly in favor of the applied arts rather than the fine arts and I decided to go into sociology."

Baley said, "That sounds as though Delmarre was a good friend of yours."

"We knew one another. At my time in life, one knows all adult Solarians. But there is no reason not to agree that Rickain Delmarre and I were well acquainted."

"What sort of a man was Delmarre?" (Strangely enough, the name of the man brought up the picture of Gladia in Baley's mind and he was plagued with a sudden, sharp recall of her as he had last seen her, furious, her face distorted with anger at him.)

Quemot looked a bit thoughtful.

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"He was a worthy man; devoted to Solaria and to its way of life."

"An idealist, in other words."

"Yes. Definitely. You could see that in the fact that he volunteered for his job as . . . as fetal engineer. It was an applied art, you see, and I told you his feelings about that."

"Was volunteering unusual?"

"Wouldn't *you* say— But I forget you're an Earthman. Yes, it is unusual. It's one of those jobs that must be done, yet finds no voluntary takers. Ordinarily, someone must be assigned to it for a period of so many years and it isn't pleasant to be the one chosen. Delmarre volunteered, and for life. He felt the position was too important to be left to reluctant draftees, and he persuaded me into that opinion, too. Yet I certainly would never have volunteered. I couldn't possibly make the personal sacrifice. And it was more of a sacrifice for him, since he was almost a fanatic in personal hygiene."

"I'm still not certain I understand the nature of his job."

Quemot's old cheeks flushed gently. "Hadn't you better discuss that with his assistant?"

Baley felt outraged. "I would certainly have done so by now, sir, if anyone had seen fit to tell me before this moment that he had an assistant." And part of the outrage was for himself since it was a pretty obvious sort of thing to check on and he had not done so.

"I'm sorry about that," said Quemot, "but the existence of the assistant is another measure of his social responsibility. No previous occupant of the post provided for one. Delmarre, however, felt it necessary to find a suitable youngster and conduct the necessary training himself so as to leave a professional heir behind when the time came for him to retire or, well, to die." The old Solarian sighed heavily. "Yet I outlived him and he was so much younger. I used to play chess with him. Many times."

"How did you manage that?"

Quemot's eyebrows lifted. "The usual way."

"You saw one another?"

Quemot looked horrified. "What an idea! Even if I could stomach it, Delmarre would never allow it for an instant. Being fetal engineer didn't blunt his sensibilities. He was a finicky man."

"Then how—"

"With two boards as any two people would play chess." The Solarian shrugged in a sudden gesture of tolerance. "Well, you're an Earthman. My moves registered on his board, and his on mine, It's a simple matter."

Baley said, "Do you know Mrs. Delmarre?"

"We've viewed one another. She's a field-colorist, you know, and I've viewed some of her showings. Fine work in a way but more interesting as curiosities than as creations. Still, they're amusing and show a perceptive mind."

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"Is she capable of killing her husband, would you say?"

"I haven't given it thought. Women are surprising creatures. But then, there's scarcely room for argument, is there? Only Mrs. Delmarre would have been close enough to Rickain to kill him. Rickain would never, under any circumstances, have allowed anyone else seeing privileges for any reason. Extremely finicky. Perhaps finicky is the wrong word. It was just that he lacked any trace of abnormality; anything of the perverse. He was a good Solarian."

"Would you call your granting me seeing privileges perverse?" asked Baley.

Quemot said, "Yes, I think I would. I should say there was a bit of scatophilia involved."

"Could Delmarre have been killed for political reasons?"

"What?"

"I've heard him called a Traditionalist."

"Oh, we all are."

"You mean there is no group of Solarians who are *not* Traditionalists?"

"I dare say there are some," said Quemot, slowly, "who think it is dangerous to be too Traditionalist. They are overconscious of our small population, of the way the other Worlds outnumber us. They think we are defenseless against possible aggression from the other Outer Worlds. They're quite foolish to think so and there aren't many of them. I don't think they're a force."

"Why do you say they are foolish? Is there anything about Solaria which would restore the balance of power in spite of the great disadvantage of numbers? Some new type of weapon?"

"A weapon, certainly? But not a new one. The people I speak of are more blind than foolish not to realize that such a weapon is in operation continuously and cannot be resisted."

Baley's eyes narrowed. "Are you serious?"

"Certainly."

"Do you know the nature of the weapon?"

"All of us must. *You* do, if you stop to think of it. I see it a trifle easier than most, perhaps, since I am a sociologist. To be sure, it isn't used as a weapon ordinarily is used. It doesn't kill or hurt, but it is irresistible even so. All the more irresistible because no one notices it."

Baley said, with annoyance, "And just what is this nonlethal weapon?"

Quemot said, "The positronic robot."

XI.

For a moment, Baley felt a chill constrict his chest. The positronic robot was the symbol of Spacer superiority over Earthmen. That was weapon enough to anger and frighten him.

He kept his voice steady. "It's an economic weapon. Solaria is important to the other Outer Worlds as a source of advanced models and so it will not be harmed by them."

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"That's an obvious point," said Quemot, indifferently. "That helped us establish our independence. What I have in mind is something else, something more subtle and something more cosmic." Quemot's eyes were fixed on his fingers' ends and his mind was obviously fixed on abstractions.

Baley said, "Is this another of your sociological theories."

Quemot's poorly suppressed look of pride all but forced a short smile out of the Earthman.

The sociologist said, "It is indeed mine. Original, as far as I know, and yet obvious if population data on the Outer Worlds is carefully studied. To begin with, ever since the positronic robot has been invented, it has been used more and more intensively everywhere."

"Not on Earth," said Baley, with quick anger.

"Now, now, plainclothesman. I don't know much of your Earth, but I know enough to know that robots are entering your economy. You people live in large Cities and leave most of your planetary surface unoccupied. Who runs your farms and mines, then?"

"Robots,' admitted Baley. "But if it comes to that, doctor, Earthmen invented the positronic robot in the first place."

"They did? Are you sure?"

"You can check. It's true."

"Interesting. Yet robots made the least headway there." The sociologist said thoughtfully, "Perhaps that is because of Earth's large population. It would take that much longer. Yes. Still, you have robots even in your cities."

"Yes," said Baley.

"More now than, say, fifty years ago."

Baley nodded impatiently. "Yes."

"Then it fits. The difference is only one of time. Robots tend to displace human labor. The robot economy moves in only one direction. More robots and fewer humans. I've studied population data *very* carefully and I've plotted it and made a few extrapolations." He paused in sudden surprise. "Why, that's rather an application of mathematics to sociology, isn't it?"

"It is," said Baley.

"There may be something to it, at that. I will have to give the matter thought. In any case, these are the conclusions I have come to, and I am convinced there is no doubt as to their correctness. The robot/human ratio in any economy that has accepted robot labor tends continuously to increase despite any laws that are passed to prevent it. The increase is slowed, but never stopped. At first the human population increases, but the robot population increases much more quickly. Then, after a certain critical point is reached—"

Quemot stopped again, then said, "Now let's see. I wonder if the critical point could be determined exactly; if you could really put a figure to it. There's your mathematics again."

Baley stirred restlessly. "What

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happens after the critical point is reached, Dr. Quemot?"

"Eh? Oh, the human population begins actually to decline. A planet approaches a true social stability. Aurora will have to. Even your Earth will have to. Earth may take a few more centuries, but it is inevitable."

"What do you mean by social stability?"

"The situation here! In Solaria! A world in which the humans are the leisure class only. So there is no reason to fear the other Outer Worlds. We need only wait a century perhaps and they shall all be Solarias. I suppose that will be the end of human history, in a way; at least, its fulfillment. Finally, finally, all men will have all they can need and want. You know, there is a phrase I once picked up; I don't know where it comes from; something about the pursuit of happiness."

Baley said, with a pang of memory, " 'All men are endowed by their Creator with certain inalienable rights; among these rights are life, liberty and the pursuit of happiness.' "

"You've hit it. Where's that from?"

"Some old document," said Baley.

"Do you see how that is changed here on Solaria and eventually in all the galaxy. The pursuit will be over. The rights mankind will be heir to will be life, liberty, and happiness. Just that. Happiness."

Baley said dryly, "Maybe so, but a man has been killed on your Solaria and another may yet die."

He felt regret almost the moment he said that for the expression on Quemot's face was as though he had been struck with an open palm. The old man's head bowed. He said, without looking up, "I have answered your questions as well as I could. Is there anything else you wish?"

"I have enough. Thank you, sir. I am sorry to have intruded on your grief at your friend's death."

Quemot looked up slowly. "It will be hard to find another chess partner. He kept our appointments most punctually and he played an extraordinarily even game. He was a good Solarian."

"I understand," said Baley, softly. "May I have your permission to use your viewer to make contact with the next person I must see."

"Of course," said Quemot. "My robots are yours. And now I will leave you. Done viewing."

A robot was at Baley's side within thirty seconds of Quemot's disappearance and Baley wondered once again how these creatures were managed. He had seen Quemot's fingers move toward a contact as he had left and that was all.

Perhaps the signal was quite a generalized one, saying only, "Do your duty!" Perhaps robots listened to all that went on and were always aware of what a human might desire at any given moment, and if the particular robot was not designed for a particular job in either mind or

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body, the radio web that united all robots went into action and the correct robot was spurred into action.

For a moment, Baley had the vision of Solaria as a robotic net with holes that were small and continually growing smaller, with every human being caught neatly in place. He thought of Quemot's picture of worlds turning into Solarias; of nets forming and tightening even on Earth, until—

The narrowing spiral of nausea in which his thoughts were caught broke with the relieving pain of a lanced boil as the robot who had entered spoke with the quiet and even respect of the machine.

"I am ready to help you, master."

Baley said, "Do you know how to reach the place where Rickain Delmarre once worked?"

"Yes, master."

Baley shrugged. He would never teach himself to avoid asking useless questions. The robots knew. Period. It occurred to him that to handle robots with true efficiency, one must needs be expert, a sort of roboticist. How well did the average Solarian do, he wondered? Probably only so-so.

He said, "Get Delmarre's place and contact his assistant. If the assistant is not there, locate him wherever he is."

"Yes, master."

As the robot turned to go, Baley called after it, "Wait! What time is it at the Delmarre workplace?"

"About 0630, master."

"In the morning?"

"Yes, master."

Again Baley felt annoyance at a world which made itself victim of the coming and going of a sun. It was what came of living on bare planetary surface.

He thought fugitively of Earth and tore his mind away. While he kept firmly to the matter in hand, he managed well. Slipping into homesickness would ruin him.

He said, "Call the assistant, anyway, boy, and tell him it's government business. And have one of the other boys bring something to eat. A sandwich and a glass of milk will do."

He chewed thoughtfully at the sandwich, which contained a kind of smoked meat, and with half his mind thought that Daneel Olivaw would certainly consider every article of food suspect after what had happened to Gruer. And Daneel might be right, too.

He finished the sandwich without ill-effects, however—immediate ill-effects at any rate—and sipped at the milk. He had not learned from Quemot what he had come to learn, but he had learned something. As he sorted it out in his mind, it seemed he had learned a good deal.

Little about the murder, to be sure, but more about the larger matter.

The robot returned. "The assistant will accept contact, master."

"Good. Was there any trouble about it?"

"The assistant was asleep, master."

"Awake now, though?"

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"Yes, master."

The assistant was facing him suddenly, sitting up in bed and wearing an expression of sullen resentment.

Baley reared back as though a force barrier had been raised before him without warning. Once again a piece of vital information had been withheld from him. Once again he had not asked the right questions.

No one had thought to tell him that Rickain Delmarre's assistant was a woman.

Her hair was a trifle darker than ordinary Spacer bronze and there was a quantity of it, at the moment in disorder. Her face was oval, her nose a trifle bulbous and her chin large. She scratched slowly at her side just above the waist and Baley hoped the sheet would remain in position. He remembered Gladia's free attitude toward what was permitted while viewing.

Baley felt a sardonic amusement at his own disillusion at that moment. Earthmen assumed, somehow, that all Spacer women were beautiful, and certainly Gladia had reinforced that assumption. This one, though, was plain even by Earthly standards.

It therefore surprised Baley that he found her contralto attractive when she said, "See here, do you know what time it is?"

"I do," said Baley, "but since I will be seeing you, I felt I should warn you."

"*Seeing* me? Skies above—" Her eyes grew wide and she put a hand to her chin. (She wore a ring on one finger, the first item of personal adornment Baley had yet seen on Solaria). "Wait, you're not my new assistant, are you?"

"No. Nothing like that. I'm here to investigate the death of Rickain Delmarre."

"Oh? Well, investigate, then."

"What is your name?"

"Kloitta Cantoro."

"And how long have you been working with Dr. Delmarre?"

"Three years."

"I assume you're now at the place of business." (Baley felt uncomfortable at that noncommittal phrase, but he did not know what to call a place where a fetal engineer worked.)

"If you mean, am I at the farm?" said Kloitta, discontentedly, "I certainly am. I haven't left it since the old man was done in, and I won't leave it, looks like, till an assistant is assigned me. Can *you* arrange that, by the way?"

"I'm sorry, ma'am. I have no influence with anyone here."

"Thought I'd ask."

Kloitta pulled off the sheet and climbed out of bed without any self-consciousness. She was wearing a one-piece sleeping suit and her hand went to the notch of the seam, where it ended at the neck.

Baley said hurriedly, "Just one moment. If you'll agree to see me, that will end my business with you for now and you may dress in privacy."

"In privacy?" She put out her

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lower lip and stared at Baley curiously. "You're finicky, aren't you? Like the boss."

"Will you see me? I would like to look over the farm."

"I don't get this business about seeing, but if you want to view the farm I'll tour you. If you'll give me a chance to wash and take care of a few things and wake up a little, I'll enjoy the break in routine."

"I don't want to view anything. I want to *see*."

The woman cocked her head to one side and her keen look had something of professional interest in it? "Are you a pervert or something? When was the last time you underwent a gene-analysis?"

"Jehoshaphat!" muttered Baley. "Look, I'm Elijah Baley. I'm from Earth."

"From Earth?" She cried vehemently. "Skies above! Whatever are you doing here? Or is this some kind of complicated joke?"

"I'm not joking. I was called in to investigate Delmarre's death. I'm a plainclothesman, a detective."

"You mean that kind of investigation. But I thought everyone knew his wife did it."

"No, ma'am, there's some question about it in my mind. May I have your permission to see the farm and you. As an Earthman, you understand, I'm not accustomed to viewing. It makes me uncomfortable. I have permission from the Head of Security to see people who might help me. I will show you the document, if you wish."

"Let's see it."

Baley held the official strip up before her imaged eyes.

She shook her head. "Seeing! It's filthy. Still, skies above, what's a little more filth in this filthy job. Look here, though, don't you come close to me. You stay a good distance away. We can shout or send messages by robot, if we have to. You understand?"

"I understand."

Her sleeping suit split open at the seam just as contact broke off and the last word he heard from her was a muttered: "Earthman!"

"That's close enough," said Kloitta.

Baley, who was some twenty-five feet from the woman, said, "It's all right this distance, but I'd like to get indoors quickly."

It had not been so bad this time, somehow. He had scarcely minded the plane trip, but there was no point in overdoing it. He kept himself from yanking at his collar to allow himself to breathe more freely.

Kloitta said sharply, "What's wrong with you? You look kind of beat."

Baley said, "I'm not used to the outdoors."

"That's right! Earthman! You've got to be cooped up or something. Skies above!" Her tongue passed over her lips as though it tasted something unappetizing. "Well, come in, then, but let me move out of the way first. All right. Get in."

Her hair was in two thick braids

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that wound about her head in a complicated geometrical pattern. Baley wondered how long it took to arrange them like that and then remembered that, in all probability, it was the unerring mechanical fingers of a robot that did the job.

The hair set off her oval face and gave it a kind of symmetry that made it pleasant, if not pretty. She did not wear any facial makeup, nor, for that matter, were her clothes meant to do more than cover her serviceably. For the most part, they were a subdued dark blue, except for her gloves, which covered her to midarm and were a badly clashing lilac in color. Apparently, they were not part of her ordinary costume. Baley noted the thickening of one finger of the gloves due to the presence of the ring underneath.

They remained at opposite ends of the room, facing one another.

Baley said, "You don't like this, do you, ma'am?"

Kloitta shrugged. "Why should I like it? I'm not an animal. But I can stand it. You get pretty hardened, when you deal with . . . with—" She paused, and then her chin went up as though she had made up her mind to say what she had to say without mincing. ". . . with children." She pronounced the word with careful precision.

"You sound as though you don't like the job you have."

"It's an important job. It must be done. Still, I don't like it."

"Did Rickain Delmarre like it?"

"I suppose he didn't, but he never showed it. He was a good Solarian."

"And he was finicky."

Kloitta looked surprised.

Baley said, "You yourself said so. When we were viewing and I said you might dress in private, you said I was finicky like the boss."

"Oh. Well, he *was* finicky. Even viewing he never took any liberties. Always proper."

"Was that unusual?"

"It shouldn't be. Ideally, you're supposed to be proper, but no one ever is. Not when viewing. There's no personal presence involved so why take any pains. You know? I don't take pains when viewing, except with the boss. You had to be formal with him."

"Did you admire Dr. Delmarre?"

"He was a good Solarian."

Baley said, "You've called this place a farm and you've mentioned children. Do you bring up children here?"

"From the age of a month. Every fetus on Solaria comes here."

"Fetus?" Baley reddened.

"Yes." She frowned. "We get them a month after conception. Does this embarrass you?"

"No," said Baley, shortly. "Can you show me around?"

"I can. But keep your distance."

Baley's long face took on a stony grimness as he looked down the length of the long room from above. There was glass between the room and themselves. On the other side, he was sure, was perfectly controlled

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heat, perfectly controlled humidity, perfectly controlled asepsis. Those tanks, row on row, each contained its little creature floating in a watery fluid of precise composition, infused with a nutrient mixture of ideal proportions. Life and growth went on.

Little things, some smaller than half his fist, curled on themselves, with bulging skulls and tiny budding limbs and vanishing tails.

Kloitta, from her position twenty feet away, said, "How do you like it, plainclothesman?"

Baley said, "How many do you have?"

"As of this morning, one hundred and fifty-two. We receive fifteen to twenty each month and we graduate as many to independence."

"Is this the only such institution on the planet?"

"That's right. It's enough to keep the population steady, counting on a life expectancy of three hundred

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years and a population of twenty thousand. This building is quite new. Dr. Delmarre supervised its construction and has made many changes in our procedures. Our fetal death rate now is virtually zero."

Robots threaded their way among the tanks. At each tank, they stopped and checked controls in a tireless, meticulous way, looking in at the tiny embryos within.

"Who operates on the mother?" asked Baley. "I mean to get the little things."

"Doctors," answered Kloitta.

"Dr. Delmarre?"

"Of course not. *Medical* doctors. You don't think Dr. Delmarre would ever stoop to— Well, never mind."

"Why can't robots be used?"

"Robots in surgery? First Law makes that very difficult, plainclothesman. A robot might perform an appendectomy to save a human life, if he knew how, but I doubt that he'd be usable after that without major repairs. Cutting human flesh would be quite a traumatic experience for a positronic brain. Human doctors can manage to get hardened to it. Even to the personal presence required."

Baley said, "I notice that robots tend the fetuses, though. Do you and Dr. Delmarre ever interfere?"

"We had to, sometimes, when things went wrong. If a fetus has developmental trouble, for instance. Robots can't be trusted to judge the situation accurately when human life is involved."

Baley nodded. "Too much risk of a misjudgment and a life lost, I suppose."

"Not at all. Too much risk of overvaluing a life and saving one improperly." The woman looked stern. "As fetal engineers, Baley, we see to it that healthy children are born; *healthy* ones. Even the best gene analysis of parents can't assure that all gene permutations and combinations will be favorable, to say nothing of the possibility of muta-

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tions. That's our big concern, the unexpected mutation. We've got the rate of those down to less than one in a thousand, but that means that, on the average, once a decade, we have trouble."

She motioned him along the balcony and he followed her.

She said, "I'll show you the infants' nurseries and the youngsters' dormitories. They're much more a problem than the fetuses are. With them, we can rely on robot labor only to a limited extent."

"Why is that?"

"You would know, Baley, if you ever tried to teach a robot the importance of discipline. First Law makes them almost impervious to that fact. And don't think youngsters don't learn that about as soon as they can talk. I've seen a three-year-old holding a dozen robots motionless by yelling 'You'll hurt me. I'm hurt.' It takes an extremely advanced robot to understand that a child might be deliberately lying."

"Could Delmarre handle the children?"

"Usually."

"How did he do that? Did he get out among them and shake sense into them."

"Dr. Delmarre? Touch them? Skies above! Of course not! But he could *talk* to them. And he could give a robot specific orders. I've seen him viewing a child for fifteen minutes, and keeping a robot in spanking position all that time, getting it to spank—spank—spank. A few like that and the child would risk fooling with the boss no more. And the boss was skillful enough about it so that usually the robot didn't need more than a routine readjustment afterward."

"How about you? Do you get out among the children."

"I'm afraid I have to sometimes. I'm not like the boss. Maybe some day I'll be able to handle the long-distance stuff, but right now if I tried, I'd just ruin robots. There's an art to handling robots really well, you know. When I think of it, though. Getting out among the children. Little animals!"

She looked back at him suddenly. "I suppose you wouldn't mind seeing them."

"It wouldn't bother me."

She shrugged and stared at him with amusement. "Earthman!" She walked on again. "What's all this about anyway? You'll have to end up with Gladia Delmarre as murderess. You'll *have* to."

"I'm not quite sure of that," said Baley.

"How could you be anything else but sure? Who else could it possibly be?"

"There are possibilities, ma'am."

"Who, for instance?"

"Well, you, for instance!"

And Kloitta's reaction to that quite surprised Baley.

XII.

She laughed.

The laughter grew and fed on itself till she was gasping for breath

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and her plump face had reddened almost to purple. She leaned against the wall and gasped for breath.

"No, don't come—closer," she begged. "I'm all right."

Baley said gravely, "Is the possibility that humorous?"

She tried to answer and laughed again. Then, in a whisper, she said, "Oh, you *are* an Earthman? How could it ever be me?"

"You knew him well," said Baley. "You knew his habits. You could have planned it."

"And you think I would *see* him? That I would get close enough to bash him over the head with something? You just don't know anything at all about it, Baley."

Baley felt himself redden. "Why couldn't you get close enough to him, ma'am. You've had practice . . . uh . . . mingling."

"With the *children*."

"One thing leads to another. You seem to be able to stand my presence."

"At twenty feet," she said contemptuously.

"I've just visited a man who nearly collapsed because he had to endure my presence for a while."

Kloitta sobered and said, "A difference in degree."

"I suggest that a difference in degree is all that is necessary. The habit of seeing children makes it possible to endure seeing Delmarre just long enough."

"I would like to point out, Mr. Baley," said Kloitta, no longer appearing the least amused, "that it doesn't matter a speck what I can endure. Dr. Delmarre was the finicky one. He was almost as bad as Leebig, himself. Almost. Even if I could endure seeing him, he would never endure seeing me. Mrs. Delmarre is the only one he could possibly have allowed within seeing distance."

Baley said, "Who's this Leebig you mentioned?"

Kloitta shrugged. "One of these odd-genius types, if you know what I mean. He's done work with the boss on robots."

Baley checked that off mentally and returned to the matter at hand. He said, "It could also be said you had a motive."

"What motive?"

"His death put you in charge of this establishment, gave you position."

"You call that a motive? Skies above, who could *want* this position? Who on Solaria? This is a motive for keeping him alive. It's a motive for hovering over him and protecting him. You'll have to do better than that, Earthman."

Baley scratched his neck uncertainly with one finger. He saw the justice of that.

Kloitta said, "Did you notice my ring, Mr. Baley?"

For a moment, it seemed she was about to strip the glove from her right hand, but she refrained.

"I noticed it," said Baley.

"You don't know its significance, I suppose?"

"I don't." (He would never have

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done with ignorance, he thought bitterly.)

"Do you mind a small lecture, then?"

"If it will help me make sense out of this world," blurted Baley, "by all means."

"Skies above!" Kloitta smiled. "I suppose we seem to you as Earth would seem to us. Imagine. Say, here's an empty chamber. Come in here and we'll sit down . . . no, the room's not big enough. Tell you what, though, you take a seat in there and I'll stand out here."

She stepped farther down the corridor, giving him space to enter the room, then returned, taking up her stand against the opposite wall at a point from which she could see him.

Baley took his seat with only the slightest quiver of chivalry countering it. He thought rebelliously: Why not? Let the Spacer woman stand.

Kloitta folded her muscular arms across her chest and said, "Gene-analysis is the key of our society. We don't analyze for genes directly, of course. Each gene, however, governs one enzyme, and we can analyze for enzymes. Know the enzymes, know the body chemistry. Know the body chemistry, know the human being. You see all that?"

"I understand the theory," said Baley. "I don't know how it's applied."

"That part's done here. Blood samples are taken while the infant is still in the late fetal stage. That gives us our rough first approximation. Ideally, we should catch all mutations at that point and judge whether birth can be risked. In actual fact, we still don't quite know enough to eliminate all possibility of mistake. Some day, maybe. Anyway, we continued testing after birth; biopsies as well as body fluids. In any case, long before adulthood, we know exactly what our little boys and girls are made of."

(Sugar and spice— A nonsense phrase went unbidden through Baley's mind.)

"We wear coded rings to indicate our gene constitution," said Kloitta. "It's an old custom, a bit of the primitive left behind from the days when Solarians had not yet been weeded eugenically. Nowadays, we're all healthy."

Baley said, "But you still wear yours. Why?"

"Because I'm exceptional," she said with an unembarrassed, unblunted pride. "Dr. Delmarre spent a long time searching for an assistant. He *needed* someone exceptional. Brains, ingenuity, industry, stability. Most of all, stability. Someone who could learn to mingle with children and not break down."

"He couldn't, could he? Was that a measure of his instability?"

Kloitta said, "In a way, it was, but at least it was a desirable type of instability under most circumstances. You wash your hands, don't you?"

Baley's eyes dropped to his hands. They were as clean as need be. "Yes," he said.

"All right. I suppose it's a meas-

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ure of instability to feel such revulsion at dirty hands as to be unable to clean an oily mechanism by hand even in an emergency. Still, in the *ordinary* course of living, the revulsion keeps you clean, which is good."

"I see. Go ahead."

"There's nothing more. My genic health is the third highest ever recorded on Solaria, so I wear my ring. It's a record I enjoy carrying with me."

"I congratulate you."

"You needn't sneer. It may not be my doing. It may be the blind permutation of parental genes, but it's a proud thing to own, anyway. And no one would believe me capable of so seriously psychotic an act as murder. Not with my gene make-up. So don't waste accusations on me."

Baley shrugged and said nothing. The woman seemed to confuse gene make-up and evidence and presumably the rest of Solaria would do the same.

Kloitta said, "Do you want to see the youngsters now?"

"Thank you. Yes."

The corridors seemed to go on forever. The building was obviously a tremendous one. Nothing like the huge banks of apartments in the Cities of Earth, of course, but for a single building clinging to the outside skin of a planet, it must be a mountainous structure.

There were hundreds of cribs, with pink babies squalling, or sleeping, or feeding. Then there were playrooms for the crawlers.

"They're not too bad even at this age," said Kloitta, grudgingly, "though they take up a tremendous sum of robots. It's practically a robot per baby till walking age."

"Why is that?"

"They sicken if they don't get individual attention."

Baley nodded. "Yes, I suppose the requirement for affection is something that can't be done away with."

Kloitta frowned and said brusquely, "Babies require attention."

Baley said, "I am a little surprised that robots can fulfill the need for affection."

She whirled toward him, the distance between them not sufficing to hide her displeasure. "See here, Baley, if you're trying to shock me by using unpleasant terms, you won't succeed. Skies above, don't be childish."

"Shock you?"

"I can use the word, too. Affection! Do you want a short word, a good four letter word. I can say that, too. Love! Love! Now if it's out of your system, behave yourself."

Baley did not trouble to dispute the matter of obscenity. He said, "Can robots really give the necessary attention, then?"

"Obviously, or this farm would not be the success it is. They fool with the child. They nuzzle it and snuggle it. The child doesn't care that it's only a robot. It's an animal.

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Things grow more difficult between three and ten."

"Oh?"

"During that interval, they insist on playing with one another. Quite indiscriminately."

"I take it you let them."

"We have to, but we never forget our obligation to teach them the requirements of adulthood. Each has a separate room that can be closed off. Even from the first, they must sleep alone. We insist on that. And then we have an isolation time every day and that increases with the years. By the time the child reaches ten, he is able to restrict himself to viewing for a week at a time. Of course, the viewing arrangements are elaborate. They can view outdoors, under mobile conditions, and can keep it up all day. Well, we make the best of it. It's a matter of evolution."

Baley said, "How is that?"

"Isn't it obvious? Each individual repeats its own evolutionary history as it develops. Those fetuses back there have gills and a tail for a time, you know. Can't skip those steps. The youngster has to go through the social animal stage in the same way. Dr. Delmarre was of the opinion that with the generations, we'd get through that stage faster and faster."

"Is that so?"

"In three thousand years, we'd have children who'd take to viewing at once. And the boss had other notions, too. He was interested in improving robots to the point of making them capable of disciplining children without becoming unstable. Why not? Discipline today for a better life tomorrow is a true expression of First Law if robots could only be made to see it."

"Have such robots been developed yet?"

Kloitta shook he head. "I'm afraid not. Dr. Delmarre and Leebig had been working hard on some experimental models."

"Did Dr. Delmarre have some of the models sent out to his estate? Was he a good enough roboticist to conduct tests himself?"

"Oh, yes. He tested robots frequently."

"Do you know that he had a robot with him when he was murdered?"

"I've been told so."

"Do you know what kind of a model it was?"

"You'll have to ask Leebig. As I told you, he's the roboticist who worked with Dr. Delmarre."

"You know nothing about it?"

"Not a thing."

"If you think of anything, let me know."

"I will. And don't think new robot models are all that Dr. Delmarre was interested in. Dr. Delmarre used to say the time would come when unfertilized ova would be stored in banks at liquid-air temperatures and utilized for artificial insemination. In that way, eugenic principles could be truly applied and we could get rid of the last vestige of any need for seeing. I'm not sure that I quite go along with him so

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far, but he was a man of advanced notions; a very good Solarian."

She added quickly, "Do you want to go outside? The five through eight group are encouraged to take part in outdoor play and you could see them in action."

Baley said, cautiously, "I'll try that. I may have to ask to be allowed inside on rather short notice."

"Oh, yes, I forgot. Maybe you'd rather not go out at all."

"No." Baley forced a smile. "I'm trying to grow accustomed to the outdoors."

The wind was hard to bear. It made breathing difficult. It wasn't cold, in a direct physical sense, but the feel of it, the feel of his clothes moving against his body, gave Baley a kind of chill.

His teeth chattered when he tried to talk and he had to force his words out in little bits. It hurt his eyes to look so far at a horizon so hazy green and blue and there was only limited relief when he looked at the pathway immediately before his toes. Above all, he avoided looking up at the empty blue, empty, that is, but for the piled up white of occasional clouds and the glare of the naked sun.

And yet he could fight off the urge to run, to return to enclosure.

He passed a tree, following Kloitta by some ten paces, and he reached out a cautious hand to touch it. It was rough and hard to the touch. Frondy leaves moved and rustled overhead but he did not raise his eyes to look at them. A living tree!

Kloitta called out. "How do you feel?"

"All right."

"You can see a group of youngsters from here," she said. "They're involved in some kind of game. The robots organize the games and see to it that the little animals don't kick each other's eyes out. With personal presence you can do just that, you know."

Baley raised his eyes slowly, running his glance along the cement of the pathway out to the grass and down the slope, farther and farther out—very carefully—ready to snap back to his toes if he grew frightened—feeling with his eyes—

There were the small figures of boys and girls racing madly about, uncaring that they raced at the very outer rim of a world with nothing but air and space above them. The glitter of an occasional robot moved nimbly among them. The noise of the children was a far-off incoherent squeaking in the air.

"They love it," said Kloitta. "Pushing and pulling and squabbling and falling down and getting up and just generally contacting. Skies above! How do children ever manage to grow up?"

"What are those older children doing?" asked Baley. He pointed at a group of isolated youngsters standing to one side.

"They're viewing. They're not in a state of personal presence. By viewing, they can walk together, talk together, race together, play together.

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Anything except physical contact."

"Where do children go when they leave here?"

"To estates of their own. The number of deaths is, on the average, equal to the number of graduations."

"To their parents' estates?"

"Skies above, no! It would be an amazing coincidence, wouldn't it, to have a parent die just as a child is of age. No, the children take any one that falls vacant. I don't know that any of them would be particularly happy, anyway, living in a mansion that once belonged to their parents, supposing, of course, they knew who their parents were."

"Don't they?"

She raised her eyebrows. "Why should they?"

"Don't parents visit their children here?"

"What a mind you have? Why should they want to?"

Baley said, "Do you mind if I clear up a point for myself. Is it bad manners to ask a person if they have had children?"

"It's an intimate question, wouldn't you say?"

"In a way."

"I'm hardened. Children are my business. Other people aren't."

Baley said, "Have you any children?"

Kloitta's Adam's apple made a soft, but clearly visible motion in her throat as she swallowed. "I deserve that, I suppose. And you deserve an answer. I haven't."

"Are you married?"

"Yes, and I have an estate of my own and I would be there but for the emergency here. I'm just not confident of being able to control all the robots if I'm not here in person."

She turned away unhappily, and then pointed, "Now there's one of them gone tumbling and of course he's crying."

A robot was running with great space-devouring strides.

Kloitta said, "He'll be picked up and cuddled and if there's any real damage, I'll be called in." She added, nervously, "I hope I don't have to be."

Baley took a deep breath. He noted three trees forming a small triangle fifty feet to the left. He walked in that direction, the grass soft and loathly under his shoes, disgusting in its softness—like walking through corrupting flesh, and he nearly retched at the thought.

He was among them, his back against one trunk. It was almost like being surrounded by imperfect walls. The sun was only a wavering series of glitters through the leaves, so disconnected as almost to be robbed of horror.

Kloitta faced him from the path, then slowly shortened the distance by half.

"Mind if I stay here a while?" asked Baley.

"Go ahead," said Kloitta.

Baley said, "Once the youngsters graduate out of the farm, how do you get them to court one another?"

"Court?"

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"Get to know one another," said Baley, vaguely wondering how the thought could be expressed safely, "so they can marry."

"That's not their problem," said Kloitta. "They're matched by gene analysis, usually when they are quite young. That's the sensible way, isn't it?"

"Are they always willing?"

"To be married? They never are! It's a very traumatic process. At first they have to grow accustomed to one another and a little bit of seeing each day, once the initial queasiness is gone, can do wonders."

"What if they just don't like their partner?"

"What? If the gene-analysis indicates a partnership what difference does it—"

"I understand," said Baley, hastily. He thought of Earth and sighed.

Kloitta said, "Is there anything else you would like to know?"

Baley wondered if there were anything to be gained from a longer stay. He would not be sorry to be done with Kloitta and fetal engineering so that he might pass on to the next stage.

He had opened his mouth to say as much, when Kloitta called out at some object far off, "You, child, you there! What are you doing?" Then, over her shoulder, "Earthman! Baley! Watch out! Watch *out*!"

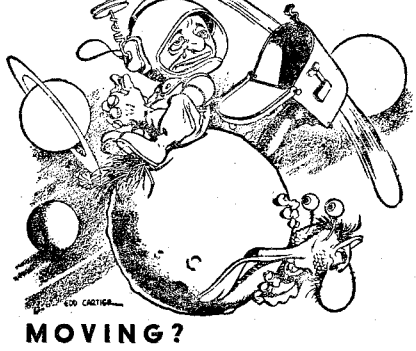
Baley scarcely heard her. He responded to the note of urgency in her voice. The nervous effort that held his emotions taut snapped wide and he flamed into panic. All the terror of the open air and the endless vault of heaven broke in upon him.

Baley gibbered. He heard himself mouth meaningless sounds and felt himself fall to his knees and slowly roll over to his side as though he were watching the process from a distance.

Also from a distance, he heard the sighing hum piercing the air above him and ending with a sharp *thwack*.

Baley closed his eyes and his fingers clutched a thin tree-root that skimmed the surface of the ground and his nails burrowed into dirt.

He opened his eyes—it must only



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have been moments after. Kloitta was scolding sharply at a youngster who remained at a distance. A robot, silent, stood closer to Kloitta. Baley had only time to notice the youngster held a stringed object in his hand before his eyes sheered away.

Breathing heavily, Baley struggled to his feet. He stared at the shaft of glistening metal that remained in the trunk of the tree against which he had been standing. He pulled at it and it came out readily. It had not penetrated far. He looked at the point but did not touch it. It was blunted, but it would have sufficed to tear his skin, had he not dropped when he did.

It took him two tries to get his legs moving. He took a step toward Kloitta and called, "You. Youngster."

Kloitta turned, her face flushed. She said, "It was an accident. Are you hurt?"

"No! What is this thing?"

"It's an arrow. It is fired by a bow which makes a taut string do the work."

"Like this," called the youngster, impudently, and he shot another arrow into the air, then burst out laughing. He had light hair and a lithe body.

Kloitta said, "You will be disciplined. Now leave!"

"Wait, wait," cried Baley. He rubbed his knee where a rock had caught and bruised him as he had fallen. "I have some questions. What is your name?"

"Bik," he said, carelessly.

"Did you shoot that arrow at me, Bik?"

"That's right," said the boy.

"Do you realize you would have hit if I hadn't been warned in time to duck."

Bik shrugged. "I was aiming to hit."

Kloitta spoke hurriedly. "You must let me explain. Archery is an encouraged sport. It is competitive without requiring contact. We have contests among the boys using viewing only. Now I'm afraid some of the boys will aim at robots. It amuses them and it doesn't hurt the robots. I'm the only adult human on the estate and when the boy saw you, he must have assumed you were a robot."

Baley listened. His mind was clearing, and the natural dourness of his long face intensified. He said, "Bik, did you think I was a robot?"

"No," said the youngster. "You're an Earthman."

"All right. Go now."

Bik turned and raced off whistling. Baley turned to the robot. "You! How did the youngster know I was an Earthman, or weren't you with him when he shot?"

"I was with him, master. I told him you were an Earthman."

"Did you tell him what an Earthman was?"

"Yes, master."

"What is an Earthman?"

"An inferior sort of human that ought not to be allowed on Solaria

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because he breeds disease, master."

"And who told you that, boy?"

The robot maintained silence.

Baley said, "Do you know who told you?"

"I do not, master. It is in my memory store."

"So you told the boy I was a disease-breeding inferior and he immediately shot at me. Why didn't you stop him?"

"I would have, master. I would not have allowed harm to come to a human, even an Earthman. He moved too quickly and I was not fast enough."

"Perhaps you thought I was just an Earthman, not completely a human, and hesitated a bit."

"No, master."

It was said with quiet calm, but Baley's lips quirked grimly. The robot might deny it in all faith but Baley felt that was exactly the factor involved.

Baley said, "What were you doing with the boy?"

"I was carrying his arrows, master."

"May I see them?"

He held out his hand. The robot approached and delivered a dozen of them. Baley put the original arrow, the one that had hit the tree, carefully at his feet, and looked the others over one by one. He handed them back and lifted the original arrow again.

He said, "Why did you give this particular arrow to the boy?"

"No reason, master. He had asked for an arrow some time earlier and this was the one my hand touched first. He looked about for a target, then noticed you and asked who the strange human was. I explained—"

"I know what you explained. This arrow you handed him is the only one with gray vanes at the rear. The others have black vanes."

The robot simply stared.

Baley said, "Did you guide the youngster here?"

"We walked randomly, master."

The Earthman looked through the gap between two trees through which the arrow had hurled itself toward its mark. He said, "Would it happen, by any chance, that this youngster, Bik, was the best archer you have here?"

The robot bent his head. "He is the best, master."

Kloitta gaped. "How did you ever come to guess that?"

"It follows," said Baley. "Now please observe this gray-vaned arrow and the others. The gray-vaned arrow is the only one that seems oily at the point. I'll risk melodrama, ma'am, by saying that your warning saved my life. This arrow that missed me is poisoned."

TO BE CONCLUDED

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BY P. SCHUYLER MILLER

SECOND-GUESSING THE POLL

When you have a mass of undigested data at your disposal, such as the returns from our "Best Books" poll, there is a terrific temptation to try to drag out of them more than people knowingly put in. Out of this temptation comes the somewhat honorable trade of the statistician . . . and it's a very useful and profitable trade if it's knowingly handled. When an amateur tries to dig something out of very little . . . well, let's see.

Ideally, I should have asked you for the kind of scorecard many of you turn in for each issue, with your list of twenty-five "best" S-F books ranked in order of preference. Practically, I'd say this is well-nigh impossible. I couldn't do it, and from the letters that accompanied your ballots, most of you couldn't either. A very few did.

The point is that this kind of vote would have given us a weighted score for every book, so that when I say your two top favorites are the classic Healy-McComas anthology, "Adventures in Time and Space," and Simak's "City," it would mean something statistically. All we can really say on the basis of the results

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as turned in is that approximately one hundred and sixty-five readers of Astounding Science Fiction listed those two books more often than any others. Nevertheless, when you go to the polls in our national elections in just a few weeks, you'll be voting this way. You won't say, "I give Eisenhower a score of X out of a possible ten, and Stevenson Y out of ten," and nobody will add up the individual scores to find out who is President.

Perhaps my reason for regretting that I asked for the club vote is a little clearer on this basis. The two votes are different kinds of thing. What I called the "General" tally, from ninety-five people, included every book they ever liked—hundreds of 'em. The tally from the seventy S-F club-members started with some such complete spread of interests, but it then lopped off the twenty-five at the top end, turned them in, and threw the rest away.

During the weeks since I sent in the results, I've been going over and over the letters and ballots, trying to glean something extra out of them. One thing I know subjectively, and might be able to demonstrate objectively with a lot of trouble. That is that the paper-backs pretty well swung this poll. In many cases it was self-evident: the books were listed by their PB titles—which I converted to the original. In others it's just a feeling: the fact, perhaps, that there was a whole spread of books getting 10, 12, 13 votes and never appearing in pocket editions, contrasted with another lot that look to be of just about the same caliber, but do have PB editions, and do rate about double the total vote.

Four years ago I tried to reach some idea of your favorite authors. This year I'm stumped. The trouble is that now we have a handful of very good one-book writers, whose score for that one book brings them into the top rating. So how do you make any fair comparison between Alfred Bester, who runs up a score of ninety-four votes on "The Demolished Man," Ted Sturgeon, who spreads the same score over six books and hence averages only fifteen point seven a book—some high, dragged down in the average by a few low scores—and Hal Clement, whose total was sixty-three for three books but who thus gets an average of twenty-one, ahead of Sturgeon? Or what about "Doc" Smith and Edgar Rice Burroughs, whose vote was scattered over eight and nine books respectively, compared with Kurt Vonnegut and George R. Stewart, who got about the same totals for their single entries?

Well—and this contradicts my decision four years ago—I am convinced that the man who hits and keeps on hitting, so that a lot of people remember a lot of his books with pleasure, is a better and more consistent writer for our purposes than the guy who does one terrific job and quits while he's ahead. It gives the edge to the prolific writer, but after all, he's the man who is

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representative of the field. So, on the basis of total votes for all books, here's how the writer-popularity list begins. There were one hundred and fifty-six writers and editors involved, so you can be sure the list won't be complete.

1. Robert A. Heinlein (17 books as author and editor)
2. A. E. van Vogt (10 books)
3. Groff Conklin, editor (12—Mr. Anthology himself)
4. Isaac Asimov (10)
5. Arthur C. Clarke (6)
6. John W. Campbell, Jr. (7)
7. Ray Bradbury (5)
8. Clifford D. Simak (4)
9. Henry Kuttner (8)
10. Jack Williamson (7)
11. Alfred Bester (1)
12. L. Sprague de Camp (6)
13. Theodore Sturgeon (6)

Heinlein got about 3.5 times as many total votes on his seventeen books as Sturgeon with his six or Bester with his one. I tell you, this kind of rating doesn't mean a thing . . .

Being kind of frustrated on this one, it then occurred to me that there might be something to be pulled out of a full-scale distribution chart of the entire balloting. You might be able to spot the fantasy bloc rallying around Bradbury and some of Clarke and a few die-hard Merritt fans. You might get a social satire trend centered on "Brave New World" and "1984" and "Space Merchants." There might even be a space-opera clique that would show up in such an analysis.

So I got out the rubber cement and glued a lot of paper together and charted it all out. Not quite all, really: I started with the fifty top books, then stretched it out to about seventy-five, and finally backed off again to fifty. The result: rows and rows of tally marks, one row for each letter—except the club vote—one tally under each book.

Next step was to cut the whole thing up into strips and start trying to rearrange them the way you would an archeological seriation chart, to see if clumps of votes for the same books would show up consistently. Of course they did—for the half dozen most popular books—but if there is any real overall pattern it will take IBM cards to show it to me. So out came the glue, and it all went back together again so that I wasn't chasing paper strips all over the apartment whenever a breeze stirred my way.

The last step I've had time for is a cross-check. What books, for example, were preferred by the forty-eight people who liked "Martian Chronicles?" Is the list very different from the one you get from the thirty who liked "Brave New World" or the twenty-two who voted for "Prelude to Space" as one of their favorites? After all, these three books more or less stand for three major divisions of science fiction: the literary fantasy, the

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sociological, and the documentary.

So I tallied 'em; night after night I tallied 'em. By rights, I should have made up a tally for everyone of the top twenty-five books—though it would have brought in several hundred titles and required a new chart. I think there are differences, but I don't know how to get at 'em with any degree of certainty or validity. Why, for example, didn't any of the people who voted for "Prelude to Space" have a good word for "Illustrated Man"—when they gave sixth place to "The Martian Chronicles" and twelfth to "Fahrenheit 451?"

Discovering no obvious relationships—except the rather obvious conclusion that S-F readers have about as cosmopolitan tastes in reading as anyone you're likely to find—I took the rather shady step of resorting to statistics. There's something called a correlation co-efficient which is supposed to indicate, somewhat quantitatively, the degree of relationship between two sets of data. For example, to use a case similar to ours, suppose twenty-five kids take one test and get one set of marks—say in algebra. Same class then takes a test in French. Is there any relationship between their grades in math and their grades in French, and roughly how much?

Correlation coefficients range between one, which you'd get if you matched a set of test scores against itself, and minus one, which means that one test zigs where the other zags: if you score well in Miss Flaubert's French exams, you can be sure of hitting the bottom in Mr. Smather's chemistry. Zero means no perceptible relationship.

Well, I've compared six sets of scores with the general tally, calculated correlation coefficients for all six, and I have no idea what the results mean, if anything. That's not quite true, I suppose, because there is a kind of reasonableness to one part of the results.

Highest correlation—0.672, for your information—is the one between the votes of the people who liked Isaac Asimov's "Foundation" and the verdict of you-all. It would probably have been closer if Asimov had never written "Second Foundation" and "Foundation and Empire," because these people voted for the whole series—at least, a third of them did—when they might otherwise have cast ballots for some of the more generally popular books. However, this result seems to say that in spite of a case of epidemic individualism in reading tastes, Asimov best represents the reading tastes of ASF readers, of the books I tested. This is not very surprising, because the "Foundation" series was born here and most people consider it typical of the magazine.

Next highest upsets this nicely, however, because it is Ray Bradbury's "The Martian Chronicles" with 0.648—and as far as I can remember, Bradbury never even sold

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a story here. O.K.—you just like good writing, wherever it appears.

Let's be smart, this time. If there are two top examples of heavy-science books in the list—*real* science fiction—they are Hal Clement's "Mission of Gravity" and Arthur C. Clarke's "Prelude to Space." The same kind of people should like them both. And do they? Well, "Mission of Gravity" was Number Two on the "Prelude to Space" list, and "Prelude" stood seventh on the "Mission" list.

And does the math bear this conclusion out? Haw!

The correlation between the "Prelude" votes and the general list is only 0.054—which is mighty close to no relationship at all. And the correlation between the "Mission of Gravity" tallies and the main list is 0.590—which is almost but not quite as close as Asimov and Bradbury. Is there, perhaps, a closer relationship between the lists for the two books? Nope: the coefficient is only 0.080.

I quit in bewilderment after two more. "Brave New World," though the ranking of individual books is quite different, has the same correlation with the main poll as "Mission of Gravity"—0.590. Please rationalize that one for me.

And "Mirror for Observers," by Edgar Pangborn, one of the finest SF novels ever published, produced a *negative* correlation of —0.514 with the main list. Apparently, if you like Pangborn your taste is the *opposite* of most ASF readers. That, I just do not believe.

A statistical binge of this kind can really get you. If I do any more of it, I'll keep quiet about the results here, unless they are sensational. I'll probably have bored the crowd at the World Convention, Labor Day week-end, with them instead. Hope you were there, and stayed for the full program.

THE SHRINKING MAN, by Richard Matheson. Gold Medal Books, New York. 1956. 192 pp. 35¢.

This, like the author's "I Am Legend," is an original novel. It hasn't the former book's shocking originality, but it is a very expert handling of an old theme which everyone longs to play with, the man who shrinks.

For no visible reason—there is some double-talk about radioactive spray—Scott Carey begins to grow smaller. In a series of flashbacks we follow him through the successive stages of humiliation and resentment as he shrinks to boy-size, child-size, baby-size, doll-size, retaining all his adult appetites in his minuscule body, and tormenting his wife and child with his almost paranoid reaction to his plight. Whether medicine could have helped him, we never know; for reasons of the story, he refuses to give it a chance. Finally the major part of the tale is played out in his last few days, in the desert of his own empty

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basement, where he must forage for food, find shelter, and traverse vast distances under the constant threat of a black widow spider.

It's as good a job of its kind as we have, and it will be released shortly as a motion picture. It can be a good one.

THE CROSSROAD OF TIME, by Andre Norton.

MANKIND ON THE RUN, by Gordon R. Dickson. Ace Books, New York. 1956. 169/151 pp. 35¢.

The Norton half of this Ace Double Novel makes it worth your silver: it was written as an original. It is an excellent fast-action yarn, in which young Blake Walker finds himself entangled in a man-hunt which shuttles him back and forth among a series of parallel time-streams and alternate worlds. It's as smoothly done as Miss Norton's space operas and interplanetary yarns.

The Dickson contribution doesn't stand up quite so well, though it moves as fast and the plots within plots are downright van Vogtian. The flaw is, I think, that the basic gimmick is stated and demonstrated but never made reasonable: a society in which, depending on your social status, you must continually move on from place to place. Some of the details are very well done, as you'd expect, but the book as a whole doesn't quite come off.

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THE MAN WHO LIVED FOREVER, by R. De Witt Miller & Anna Hunger.

THE MARS MONOPLY, by Jerry Sohl. Ace Books, New York. 1956. 137/183 pp. 35¢.

This is about the low point in the series of double novels that have been coming from Ace recently. "The Mars Monopoly" is a western transplanted to the future and to Mars, with villainous industrialists, heroic asteroid miners, misunderstood natives, and a least-suspected bad man. The Miller-Hunger effort is just another story about someone who keeps on living for the good of mankind, even though he has to slaughter a long series of young stalwarts to do it. I'm growing allergic to books in which the chief character is The Master. I'll have to write one myself, to take the curse off and get a fresh point of view . . .

EDGAR RICE BURROUGHS BIBLIO, edited by Bradford M. Day. Science-Fiction & Fantasy Publications, 127-01 116th Avenue, South Ozone Park 20, New York. 1956. 29 pp. 50¢.

Another Brad Day service to the collector: this time for the Burroughs fan. He has also done an excellent similar job with Talbot Mundy's long list of adventure and adventure-fantasy books and magazine stories, for the same price.

This bibliography is sub-titled, quite honestly, "materials *toward*" a full Burroughs bibliography. Anyone who has been reprinted and pirated as often as the creator of John Carter and Tarzan must have left many, many titles still to be located and annotated. Still, it's an excellent basic job, well worth the price. I missed principally a series listing for the Mars, Venus, Pellucidar and Tarzan books, especially the three former, which will show in what order the books follow each other.

IT #6: UPA ISSUE, Walter L. Lee, Jr., 9850 Yoakum Drive, Beverly Hills, California. 1956. 90 pp. 50¢.

A neat job of three-color, well-registered hectographing with offset cover and some illustrations comes from the fan press that recently surveyed the science fiction and fantasy film field. This is a running account of the personalities involved in making the famous UPA ("Mister Magoo," "Gerald McBoing Boing," "Telltale Heart") cartoons, something of what they have done and how they do it, and a little about what they have on the fire. I wish I'd seen many more of the cartoons, listed here.

THE END

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Continued from page 9

gadget was demonstrated; he got his patent.

But Orton, apparently, had to explain his device. You should see that explanation! Since the only action-at-a-distance theory acceptable in science is a radiation phenomenon of some type, and since X rays, gamma rays, et cetera, are now fairly well mapped, Orton had to come up with an explanation that was radiation-and-therefore-acceptable, but was *not* a well-mapped radiation.

The explanation is it's all done with the meson field. Cosmic rays stir up mesons everywhere; mesons penetrate matter. (He'd have done better with a neutrino-field theory, I think, but his explanation's a lovely thing—if you read it fast.) Now inasmuch as Yukawa originally postulated the meson to explain the extremely *short* range forces at work in the nucleus, it's remarkable to see Orton using it to explain an inexplicable *long* range phenomenon!

Necessarily, a patent office man is a cook-book scientist; he has to know what's in the books. Nonsense is that which is not in the books, or goes contrary to what's in the book.

But if an idea is in the books, it's not patentable.

This puts the patent office staff and the inventor at loggerheads to start with. If it isn't impossible, it isn't new, and so isn't patentable. If it is new, but is derivable from simple combination of known factors, it isn't patentable either. If it is specifically stated as being impossi-

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ble, by all the recognized authorities in the field, then it is patentable in theory, except that that proves it's nonsense, so it isn't patentable.

If all the textbooks say that the metal dubium cannot be electroplated in an alkaline solution, but only in acid solution, it's nonsense to claim you have plated it in a solution of KOH. But you can't patent plating it in HCl, because everybody knows it can be plated in acid solution.

Everybody knows that you can't amalgamate iron; therefore patenting a process for amalgamating iron, or using amalgamated iron, is nonsense. Everybody knows you can't amalgamate iron, they've shipped mercury in iron flasks for generations. (If you're interested; make some sodium amalgam. Drop it in a solution of NaOH, and start working it with an iron or steel tool. Presto! Iron amalgam!)

Orton's patent is valid enough; any Missourian can accept that type of phenomenon. It's just the silly-season explanation he was forced to give to make the theoreticians of the patent office happy.

If Mr. A has a real phenomenon, and Dr. B can't understand *how* it can happen, he'll demand of A that he give an explanation acceptable to Dr. B in Dr. B's terms. Now if it happens that the phenomenon simply doesn't exist in Dr. B's terms, and Dr. B can't accept that anything not explainable in his terms can exist . . . if Mr. A is a good, fast, smooth talker he'll maybe get somewhere with Dr. B by making things confusing enough so that Dr. B can't quite make out whether he's been given an explanation or not.

Imagine trying to explain the germ theory of disease to Dr. Harvey, discoverer of the circulation of the blood. Wonder how far you'd get with your theory of invisible animals that ate people from the inside out, without causing pain with their gnawings?

The trouble is, the psionic devices are not physical science devices. They do not fit in the map of the field of physics, any more than you can talk about the chemical constitution of a neutron, or discuss the corrosion resistance of a magnetic field. If you support something on an electrostatic field, how do you lubricate the supporting bearing?

How long will a transformer core last before the magnetic field wears it out?

The additional difficulty is this factor: when a man designs a vacuum tube, and has it built according to specifications, he knows exactly what he put in it, and knows what its characteristics are . . . he is convinced. When a Roman engineer designed an aqueduct, and specified limestone—did he put calcium carbonate in his aqueduct structure? Of course not! He knew what went into it; he supervised the work himself, and he didn't put any blasted chemicals in it—just good, sound limestone blocks.

The engineer designing electronic components, knows *some* of the

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characteristics he builds in. Some he wants, and is striving for; some he gets whether he likes it or not, and some he gets even though he wishes he could keep 'em out. The electronics designer working on transformers for air-borne radar, for instance, knows he gets mass, which he very specifically does not want, as well as the conductivity of copper, the magnetic properties of iron, et cetera.

Wonder what else he gets? Of course, he is aware that he's putting chemicals into his electronic structure —frequently to his intense annoyance, because of corrosion and electrolysis problems. What he wants is a conductor, with no mass and no chemical properties whatever; then it wouldn't weigh down his equipment, and wouldn't corrode. But he knows that any real conductor has the conductivity property he needs—but not enough of that—and is heavy and corrodes, will melt if overheated, and oxidizes to destruction before that. And iron passes the Curie point and loses its magnetism at temperatures well below those encountered in some jet-plane situations.

What other, unknown and unsuspected properties are being built into ordinary devices? The Roman didn't know he put chemicals in his aqueduct; what doesn't the modern engineer know he put in his vacuum tube?

A unit may look like a transformer to you . . . but I may be using it as a paperweight. I'm using the characteristic mass, which the engineer didn't intend, and actually didn't want, instead of the intended characteristics.

What characteristics of vacuum tubes is Hieronymus using in his machine? The machine works when it is not plugged into a power source; evidently he is *not* using the vacuum tube in the sense the designer intended. But the device does not work if the vacuum tubes are defective, or if a 6J6 is plugged in where a 6AU6 belongs. So evidently some characteristic is being used. I might use a 60-cycle power transformer for a paperweight, but if a radio-frequency transformer were substituted, it wouldn't work. An RF transformer handling thirty watts may weigh a fraction of an ounce; it isn't equiva-

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lent in terms of *my* use of it, even though it does have the same wattage of purpose.

There's a river vaster than the Mississippi flowing through here—and it's right close to us, and invisible, and it effects all our living. But it won't fit on any of the maps we have, so it is ruled out as a crackpot idea. Imagine! An invisible river that is immensely important and has huge effects, and yet the man says he can't point to it, or show it to us, or show us any of these so-important effects! The guy's an obvious crackpot!

I'd like to ask a question, though: Anybody around here really convinced that *purpose* does not exist in the reality of living?

It's something of a river itself. Invisible, surely, and you can't point to it, and it definitely doesn't fit on any map that science has yet made, so it isn't real, I guess.

But it's a strange thing; the scientist labors long and hard and deeply, risks his life, and works at a job that, perhaps, doesn't yield the pay he might get elsewhere—and can't find a place, anywhere in his whole cosmology, for *purpose*.

Inorganic matter doesn't have purpose.

If a device were built that somehow directly interacted with purpose, what kind of inorganic meter would show that interaction?

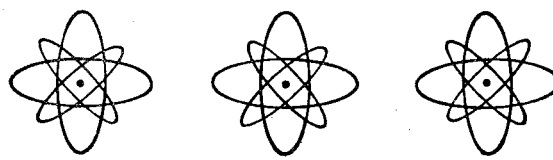
It's unfortunately difficult to communicate purpose, because there are no terms to define it, no measure to assay it, and it is denied reality in all of science. Even the semi-scientific fields of psychology, sociology, and anthropology, aping their highly successful older cognates, physics and chemistry, deny that purpose is a reality in the Universe.

There's a mighty river that isn't on the maps; it roars by, invisible and immense, the vast stream of purposive life, a river-within-an-ocean, made up of inorganic matter, but different from it in being caught up in a non-matter force.

What difference is there between the air molecules of the Jet Stream or the Gulf Stream, and the molecules of the atmosphere or the ocean?

None, of course! That proves there isn't any such entity as those invisible rivers, doesn't it?

THE EDITOR.



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